

SPECIAL
REPORT
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Witherby Seamanship International

SHIPPING REGULATIONS AND GUIDANCE

SPECIAL REPORT



SPECIAL
REPORT
ON ECDIS

CONTACTS



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INTERNATIONAL

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CONTENTS

■ ECDIS Introduction.....	1
■ ECDIS Useful Info	2
■ ECDIS.....	3
■ STCW 2011 What are the Changes?	4
■ The Training Challenge for ECDIS	6
■ Implementation	12
■ Training	13
■ Available Systems	13
■ Amendments.....	14
■ Cost	15
■ Important Safety Notice.....	16
■ ECDIS Procedure Guide	18
■ The ECDIS Manual.....	22
■ Introduction to ECDIS Articles	27
Type Specific Training.....	28
A View of ECDIS from the Author of Nav Basics	29
The Deep Sea Pilots View of ECDIS	30
ECDIS a Brief Masters View	31
The ECDIS Display Configuration.....	32
A Bespoke CBT Developer's View of ECDIS.....	34
ECDIS Challenges Unlocked by Videotel	35
Round the Horn with ECDIS	36
The I.T. Specialist View of ECDIS.....	37
Evolution of ECDIS	38
The Masters Perspective of ECDIS	40
ECDIS A Risk Manager's Perspective	42
ECDIS Matters	43
ECDIS on Malacca/Singapore Straits.....	44
The Revolution on the Bridge Made by ECDIS.....	46
■ Choosing ECDIS Systems.....	48

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Readers who have questions regarding the interpretation and/or implementation of IMO instruments or national regulations should direct these to their National Maritime Administration or their representing Classification Society.

WELCOME

The world of shipping becomes more regulated with each passing year, with an ever increasing number of regulatory items entering force, each with associated guidance. This periodical aims to brief the reader on such topics with clarity. It is not an instant news service but provides clear analysis of the issues facing shipping today.

There are many owners and operators who are aware of impending legislation, whether at an international or specific territorial level, but who have not committed the time to assessing how they, their business and their ships will respond. This periodical will keep up-to-date with current matters and those coming through over the next few years. Existing items will be covered for those who are trying to get a grip on topical matters in our industry.

A publication of this nature could not be prepared without referencing the substantial resources that IMO has made available at www.imo.org, from which many extracts and references have been used in the preparation of this publication.

Iain Macneil
Managing Director

Witherby Publishing Group Ltd

NEXT ISSUE: AUGUST 2012

ECDIS

INTRODUCTION

Witherby Publishing Group, in partnership with ECDIS Ltd, recently published two ECDIS titles 'ECDIS Procedures Guide' and 'The ECDIS Manual'

The development of the books began in early 2010, when it started to become clear to us that the phased installation of ECDIS was not only a significant event in the industry, but one that had the potential to cause confusion. Certainly we felt that, by the key date of July 2012, the industry as a whole was not likely to be ready. There were certainly going to be a lot of ECDIS sales documents around, however!

The purpose of this brochure is to provide you with an insight into the current situation with regard to ECDIS, to highlight the information you need to know, to provide some thoughts from a range of people affected by the change and, of course, to show you how the two new volumes will help you steer through the minefield of compliance in a positive and business enhancing manner.

The IMO requirement for phased installation of ECDIS on board all ships, beginning July 2012, has seen a rapid increase in the number of companies wishing to take a share of the future market for new and integrated NAVAID systems.

Pilot Magazine offered a less optimistic view of the design and manufacturing element of the navigation system:

"ECDIS has been developed in a haphazard way over the last 15 years by technicians and manufacturers with little knowledge of the requirements of the end user."

While we can understand this point of view, we don't believe it to be entirely true!

Without doubt, ECDIS can alleviate the navigator's workload in terms of manually fixing the ship's position. This delegation to an electronic system allows navigators to focus on other critical tasks, ie collision risk assessment and avoidance.

However, implementation of ECDIS across all ships places further financial burden on shipowners. Pilots are reporting poorly thought out installation of ECDIS units on existing ships. Newbuilds from Asian markets are coming onto the market with space for ECDIS on the bridge designed into the construction. However, older vessels having to retrofit are seeing unsatisfactory compromises being made in order to squeeze the new technologies onto the bridge.

I encourage you to look through this special report, and if you find it useful, pass it along to a colleague, or advise them that there is both an eBook version that can be downloaded from [witherby-ebooks.com](http://www.witherby-ebooks.com) and a PDF that can be accessed at:



View the PDF at:

http://www.shippingregs.org/refdocs/ECDIS_Special_Report.pdf

I hope that you find it useful ●



Iain Macneil

Managing Director

Witherby Publishing Group

“ It started to become clear to us that the phased installation of ECDIS was not only a significant event in the industry, but one that had the potential to cause confusion ”

ECDIS ABBREVIATIONS AND USEFUL INFO

ATC	Automatic Track Control
CATZOC	Category of Zone of Confidence of Data (ZOC)
CD	Chart Datum
ENC	Electronic Navigational Chart
ENS	Electronic Navigation System
GNSS	Global Navigational Satellite System
HOT	Height of Tide
IRPCS	International Regulations for Preventing Collisions at Sea (COLREGS)
LAT	Lowest Astronomical Tide
LDL	Limiting Danger Line
MSL	Mean Sea Level



Raster

PE90	Developed for use with Russia's global navigation Satellite system (GLONASS). This differs from WGS-84 by only a few metres
PPS	Primary Position Source
RAIM	Receiver Autonomous Integrity Monitoring
RCDS	Raster Chart Display System
RENC	Regional ENC Coordinating Centre
RIO	Radar Information Overlay
RNC	Raster Navigational Chart
RO	Recognised Organisation/Classification Society
SCAMAX	Scale Maximum
SCAMIN	Scale Minimum
SENC	System Electronic Navigational Chart
SRNC	System Raster Navigational Chart Database
VARs	Value Added Resellers
WGS-84	World Geodetic System 84 – today's main global reference system designed to be used with the USA's Global Positioning System (GPS)
WEND	Worldwide Electronic Navigational Chart Database

Vector

IHO STANDARDS

S-52	Specifications for Chart Content and Display Aspects of ECDIS (chart symbols etc)
S-57	IHO Transfer Standard for Digital Hydrographic Data
S-61	Product Specification for Raster Navigational Charts (RNC)
S-63	IHO Data Protection Scheme for ECDIS and encryption
S-100	IHO Universal Hydrographic Data Model – extends the scope of the existing S-37

1	2	3	4	5	6
ZOC 1	Position Accuracy	Depth Accuracy	Seafloor Coverage	Typical Survey Characteristics	CATZOC Symbol
A1	± 5 m + 5% depth	= 0.50 + 1% d	Full area search undertaken. Significant seafloor features detected and depths measured.	Controlled, systematic survey high position and depth accuracy achieved using DGPS or a minimum three high quality lines of position (LOP) and a multibeam, channel or mechanical sweep system.	
		Depth (m)			
		Accuracy (m)			
		10			
		30			
A2	± 20 m	= 1.00 + 2% d	Full area search undertaken. Significant seafloor features detected and depths measured.	Controlled, systematic survey achieving position and depth accuracy less than ZOC A1 and using a modern survey echosounder and a sonar or mechanical sweep system.	
		Depth (m)			
		Accuracy (m)			
		10			
		30			
B	± 50 m	= 1.00 + 2% d	Full area search not achieved; uncharted features, hazardous to surface navigation are not expected but may exist.	Controlled, systematic survey achieving similar depth but lesser position accuracies than ZOC A2, using a modern survey echosounder, but no sonar or mechanical sweep system.	
		Depth (m)			
		Accuracy (m)			
		10			
		30			
C	± 500 m	= 2.00 + 5% d	Full area search not achieved, depth anomalies may be expected.	Low accuracy survey or data collected on an opportunity basis such as soundings on passage.	
		Depth (m)			
		Accuracy (m)			
		10			
		30			
D	Worse Than ZOC C	= 2.00 + 5% d	Full area search not achieved, large depth anomalies may be expected.	Poor quality data or data that cannot be quality assessed due to lack of information.	
		Depth (m)			
		Accuracy (m)			
		10			
		30			
U	Unassessed – The quality of the bathymetric data has yet to be assessed	= 2.00 + 5% d	Full area search not achieved, large depth anomalies may be expected.	Poor quality data or data that cannot be quality assessed due to lack of information.	
		Depth (m)			
		Accuracy (m)			
		10			
		30			

ZOC Table with corresponding ECDIS Symbols

ECDIS

ECDIS TO BE PHASED IN BETWEEN 2012 & 2018

MSC 86 adopted amendments to SOLAS, Chapter V Regulation 19, on the carriage requirements for shipborne navigational systems and the equipment that makes the carriage of an electronic chart display and information system (ECDIS) mandatory.

ECDIS is now accepted as meeting the requirement to have nautical charts to plan and display the ship's route for the intended voyage and to plot and monitor positions throughout the voyage.

NEW BUILD SHIPS

These are the requirements to fit ECDIS on new build ships (that will be engaged on international voyages) based on their construction date (on or after):

- 1 July 2012 for passenger ships ≥ 500 gt
- 1 July 2012 for tankers $\geq 3,000$ gt
- 1 July 2013 for cargo ships, other than tankers $\geq 10,000$ gt
- 1 July 2014 - cargo ships, other than tankers $\geq 3,000$ gt but $< 10,000$ gt.

IMPLEMENTATION DATE FOR SHIPS CONSTRUCTED BEFORE THE FOLLOWING DATES:

- 1 July 2012 for passenger ships ≥ 500 gt, not later than the first survey* on or after 1 July 2014
- 1 July 2012 for tankers $\geq 3,000$ gt, not later than the first survey* on or after 1 July 2015
- 1 July 2013 for cargo ships, other than tankers, $\geq 50,000$ gt, not later than the first survey* on or after 1 July 2016
- 1 July 2013 for cargo ships, other than tankers, $\geq 20,000$ gt but $< 50,000$ gt, not later than the first survey* on or after 1 July 2017
- 1 July 2013 for cargo ships, other than tankers, $\geq 10,000$ gt but $< 20,000$ gt, not later than the first survey* on or after 1 July 2018.

Administrations may exempt ships from implementing these requirements if they will be taken permanently out of service within two years of the specified implementation date.

* The term 'first survey' in this context means the first annual survey, the first periodical survey or the first renewal survey, whichever is due first after the date specified in the relevant regulation, or any other survey if the Administration deems it to be reasonable and practicable, taking into account the extent of repairs and alterations being undertaken. Ref MSC.282(86)

BACK-UP SYSTEM

The 'Performance standards for Electronic Chart Display Information Systems (ECDIS)' were detailed in A.817(19). The most recent amendments to that Assembly resolution are in MSC.232(82). This MSC Resolution contains a new Appendix 6 on 'Back-Up requirements in case of ECDIS Failure'. It states that adequate independent back-up arrangements should be provided to ensure safe navigation in case of ECDIS failure. Section 3.1.4, 'Display Information', states:

"If the back-up is an electronic device, it should be capable of displaying at least the information equivalent to the standard display as defined in this performance standard"

Therefore, shipowners who want to get rid of paper charts when ECDIS becomes mandatory will need to have two

separate systems on each ship. The alternative is that the shipowner installs one ECDIS unit, but still provides the existing paper charts.

COST OF ECDIS EQUIPMENT

In practice, the requirement for back-up services will mean that ships will need two systems to be installed to eliminate the use of paper charts, or one ECDIS system plus a paper chart system as back-up.

It has been recently reported that there are around 25 fully compliant ECDIS models on the market, with the most basic costing from around \$20k and a feature rich version costing up to \$250k (or \$500k if the two such ECDIS units were installed).

... it is important for your readers to be clear that it is only a twin electronic chart display and information system, with the official vector charts issued by a government hydrographic authority, that meets International Maritime Organization standards of paperless carriage compliance.

Rear Admiral Ian Moncrieff
UK National Hydrographer

In a letter to Lloyd's List, Tuesday 13 October 2009

ECDIS CHARTS

With GPS we came to look for NMEA 0183 compatibility; with ECDIS charts the correct format is known as 'S57 compliant' (S-57 compliant describes a technical exchange standard), which refers to the specifications set by the IHO.

If an ECDIS was not 'S57 compliant', the system would be regarded as a raster chart display service. Raster charts are simply scanned versions of paper charts. ECDIS charts, however, are layered databases of information that can be interrogated, providing the navigation functionality of raster charts but with the ability to simplify the display, remove layers and set alarms that are placed on the chart data, along with a number of other features.

TRAINING

There is a feeling that training on ECDIS could be made mandatory and, with the next STW meeting in January 2010, the lack of training in ECDIS is likely to be high on the agenda.

However, this does raise the issue that, should ECDIS training become mandatory, there are currently not enough ECDIS training facilities to deal with the up to half a million seafarers who would need training over the next eight years.

The industry and chart agents gathered in Singapore between the 19th – 21st October, at the Singapore Maritime & Port Authority hosted third International ECDIS Conference, which was co-sponsored by the UKHO, to discuss the various issues with the systems and what ECDIS can offer to users. The UKHO, are adding a new section to the Mariner's Handbook that will provide generic guidance on ECDIS.



STCW 2011

WHAT ARE THE CHANGES?

The STCW Convention was adopted in 1978 to establish basic requirements on training, certification and watchkeeping for seafarers on an international level and, on 1st February 2002, the 1995 amendments were fully implemented, introducing a new STCW Code divided into two sections, Part A being mandatory and Part B recommended guidance.

Over the 21st - 25th June 2010, the Manila amendments were agreed. They are intended to bring the Code up to date and address perceived weaknesses through the standardisation of practices. Such concerns include accidents and casualties, changes in the geographical supply of labour, inconsistent training, questions related to authenticity, and implementation of standards by signatory parties. The changes make the Code more prescriptive with a strengthened means of enforcement and control.

As with the existing regulations, the country issuing a seafarer's certification will determine any necessary training to ensure compliance. This will vary between countries based on the perceived gap between their existing training requirements and the new regulations.

It is intended that the regulations will be reviewed every 5 years with a full review of the Code every 10 years. The schedule for entry is as follows:

- 1st January 2012 entry into force. Hours of Rest regulations take effect.
- 1st July 2013 approved courses have to meet and be certified in accordance with new standards. By this date, governments will need to submit compliance documents to remain on the 'white list'.
- 1st January 2017 full implementation, after which all standards, including certificate renewal and revalidation must be complied with.

Within the new amendments is an increase in the demonstration of competence using simulator training and the use of modern training methodologies, such as eLearning or distance learning. There is greater prescription and emphasis on environmental awareness and regulation, leadership, teamwork and management competences, particularly for officers.

ECDIS has been included in many areas of the 2010 amendments affecting both the competence sections of Part A and the Guidance section in Part B. Some of the key changes follow.

Table A-II/1, Navigation at the operational level, requires demonstration of competence by examination and assessment of evidence on either approved simulators and/or approved training ship experience. The following is specified:

- Knowledge of the capability and limitations of ECDIS operations
- Proficiency in operation, interpretation, and analysis of information obtained from ECDIS.

Table A-II/2, Navigation at the management level, requires demonstration of competence by examination and assessment of evidence on an approved simulator, approved in-service training or approved training ship experience. The following is specified:

- Management of operational procedures, system files and data
- Use ECDIS playback functionality for passage review, route planning and review of system functions.

For OOWs and for Masters on ships of less than 500 gt engaged on near-coastal voyages, except for those who exclusively serve on ships not fitted with ECDIS, Table A-II/3, Navigation at the operational level, requires a thorough knowledge of and ability to use ECDIS. This competence is to be demonstrated through examination and assessment of evidence on approved ECDIS simulator training and/or approved in-service training.



Portpictures

STCW B-I specifies the training and assessment in the operational use of ECDIS. It provides guidance in the use of simulators and the need to meet the equipment performance specifications in STCW A-I/12. General direction is provided for:

- Goals of an ECDIS training programme
- Theory and demonstration
- Simulator exercise
- Principal types of ECDIS systems and their display characteristics
- Risks of over-reliance on ECDIS

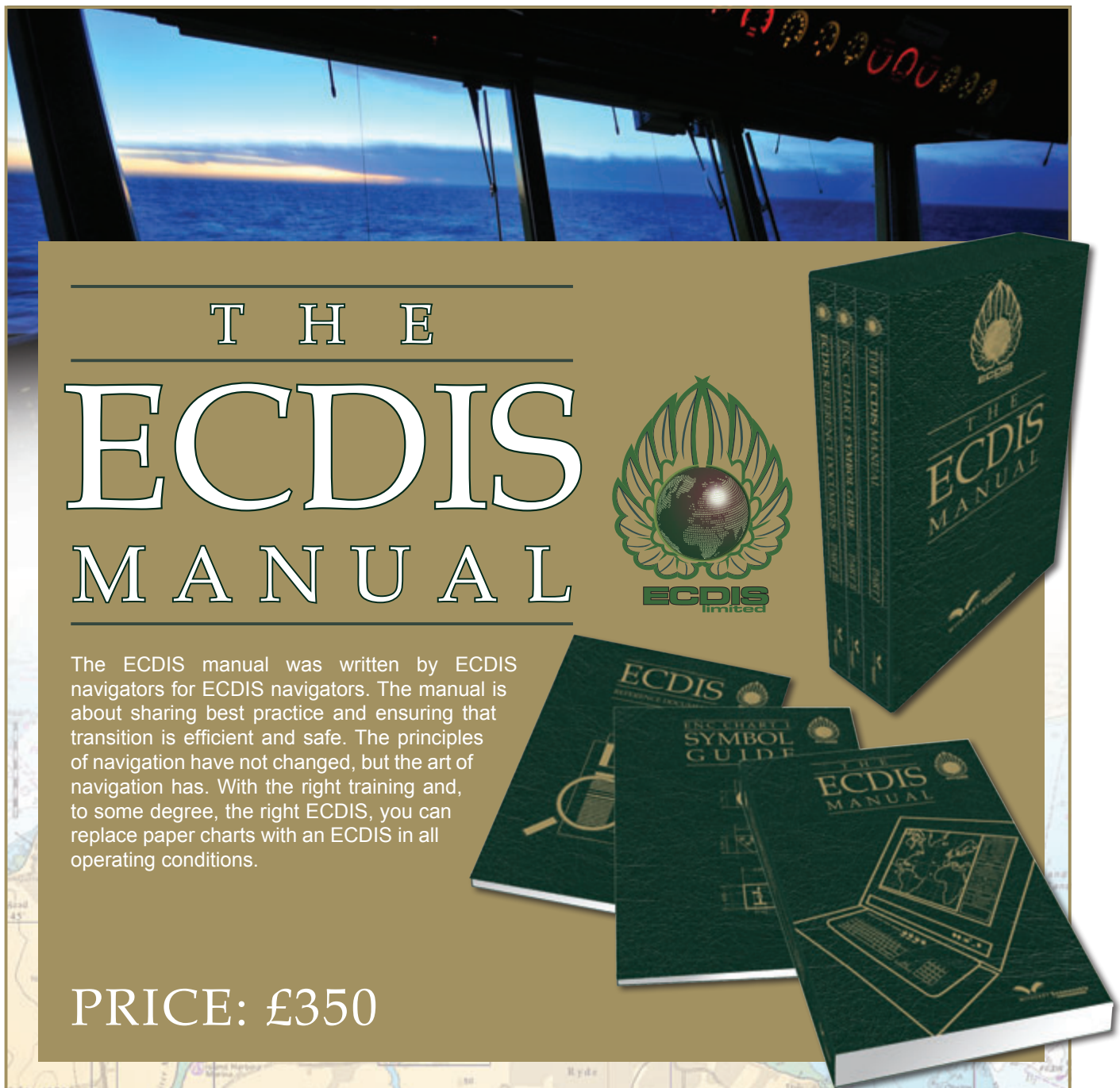
- ◉ Detection of misrepresentation of information
- ◉ Factors affecting system performance and accuracy
- ◉ Setting up and maintaining display
- ◉ Operational use of electronic charts
- ◉ Route planning
- ◉ Route monitoring
- ◉ Alarm handling
- ◉ Manual correction of a ship's position and motion parameters
- ◉ Records in the ship's log
- ◉ Chart updating
- ◉ Operational use of ECDIS where radar/ARPA is connected
- ◉ Operational use of ECDIS where AIS is connected
- ◉ Operational warnings, their benefits and limitations

- ◉ System operational tests
- ◉ Debriefing exercise.


The following guidance sections have also been added to Part B:

- ◉ Section B-V/d - Guidance on application of the provisions of the STCW Convention to mobile offshore units (MOUs)
- ◉ Section B-V/e - Guidance regarding training and qualifications of masters and officers in charge of a navigational watch on board offshore supply vessels
- ◉ Section B-V/f - Guidance on the training and experience for personnel operating dynamic positioning systems
- ◉ Section B-V/g - Guidance regarding training of masters and officers for ships operating in polar waters.

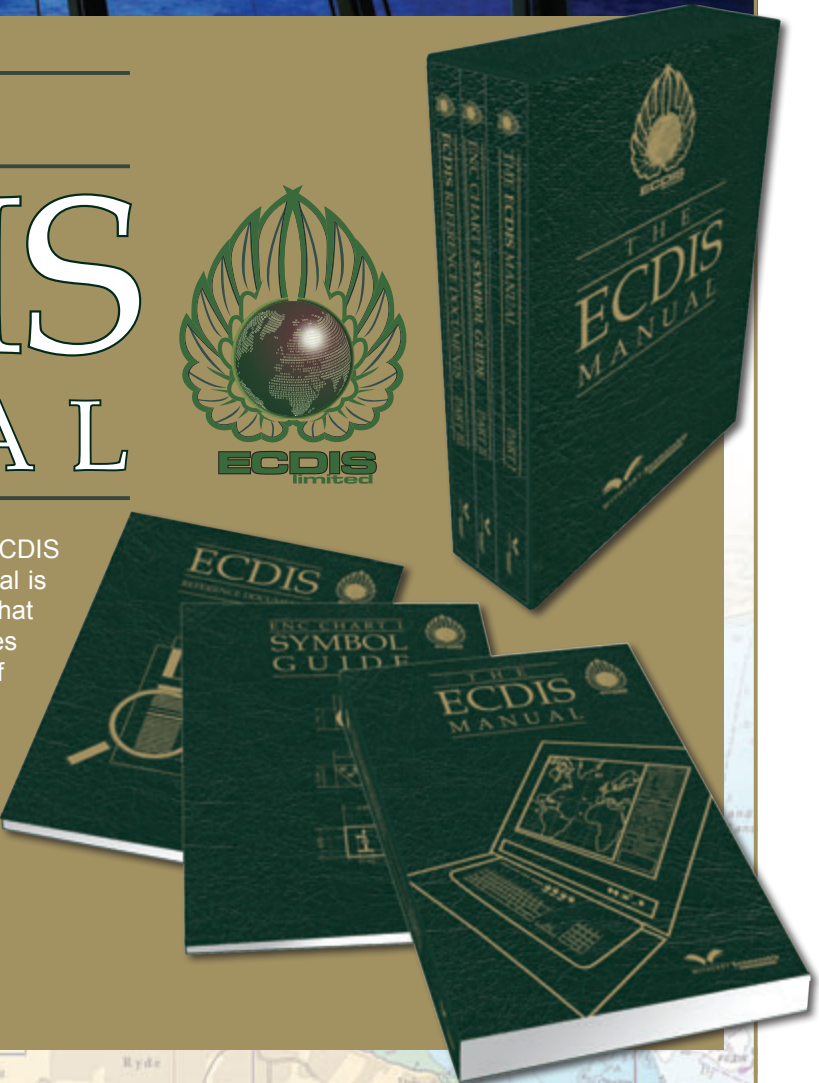
Damage control guidance is also provided under B-V/2-2, describing the competence, knowledge, understanding and proficiency recommended for supporting the development of standards for the certificates of competency described in A-II/1, A-II/2 and A-III/2.



T H E ECDIS M A N U A L



ECDIS
limited



The ECDIS manual was written by ECDIS navigators for ECDIS navigators. The manual is about sharing best practice and ensuring that transition is efficient and safe. The principles of navigation have not changed, but the art of navigation has. With the right training and, to some degree, the right ECDIS, you can replace paper charts with an ECDIS in all operating conditions.

PRICE: £350



THE TRAINING CHALLENGE FOR ECDIS

If you use an ECDIS professionally at sea – you need training.

IMO ECDIS IMPLEMENTATION SCHEDULE

On the 1st January 2011, the SOLAS Convention was amended by MSC Resolution 282(86), which required the phased installation of ECDIS onboard ship between 01 July 2012 through to 2018, depending on ship type.

While the 2012 date has been much publicised, there is less awareness that high speed craft are already required to have an ECDIS fitted under the HSC Code, Chapter 13:

13.8.2 High-speed craft shall be fitted with an ECDIS as follows:

- .1 craft constructed on or after 1 July 2008;**
- .2 craft constructed before 1 July 2008, not later than 1 July 2010.**

Combining the requirements of the HSC Code Ch 13.8.2 and SOLAS Ch V Reg 19 2.10, the following is a complete list of ECDIS installation requirements (to date):

ECDIS shall be fitted on:

- High-speed craft constructed on or after 1 July 2008
- High-speed craft constructed before 1 July 2008, not later than 1 July 2010
- Passenger ships > 500gt constructed on or after 1 July 2012
- Tankers > 3,000gt constructed on or after 1 July 2012
- Cargo ships > 10,000gt constructed on or after 1 July 2013
- Cargo ships > 3,000gt but < 10,000gt constructed on or after 1 July 2014
- Passenger ships > 500gt constructed before 1 July 2012, not later than the first survey on or after 1 July 2014
- Tankers > 3,000gt constructed before 1 July 2012, not later than the first survey on or after 1 July 2015
- Cargo ships > 50,000gt constructed before 1 July 2013, not later than the first survey on or after 1 July 2016
- Cargo ships > 20,000gt but < 50,000gt constructed before 1 July 2013, not later than the first survey on or after 1 July 2017
- Cargo ships > 10,000gt but < 20,000gt constructed before 1 July 2013, not later than the first survey on or after 1 July 2018



Another interpretation of the ECDIS phase in dates is:

- As of 01 July 2010, all High Speed Craft had to have an ECDIS fitted.
- As of 01 July 2014, all Passenger Ships > 500gt will have to have an ECDIS fitted.
- As of 01 July 2015, all Tanker Ships > 3000gt will have to have an ECDIS fitted.
- As of 01 July 2018, all Cargo Ships > 10000gt will have to have an ECDIS fitted.

Note/. These are aside from particular cases based on survey dates and those ships that will be taken out of service within 2 years of their implementation date (which may be exempt by administrations).

Although ships will be required to fit ECDIS, this does not mean that they must go 'paperless' and navigate using ECDIS as a replacement for paper charts. A ship may continue to use paper charts as its 'primary' means of navigation and use ECDIS as supplementary navigational aid. However, ECDIS equipment must be maintained and used in accordance with the performance standards. The final decision to replace paper charts with ECDIS continues to be made by the ship owner.

Reports from shipping companies that were early adopters of ECDIS indicate that they are now seeing their costs breaking even, so it appears reasonable that in the near future it could be cost effective for ship owners to make the commitment to switch to ECDIS as a replacement for paper charts. This may also be a safer option as the dangers of 'de-facto' navigation utilising a poorly set up and misunderstood ECDIS on the bridge front while forgetting about the paper chart is becoming increasingly apparent, with a rise in reported incidents on the websites of MAIB, NTSB, ASTB and TSBC.

IMO ECDIS TRAINING GUIDANCE

The development of a complex navigational system such as ECDIS, which replaces hundreds of years using paper charts, necessitates a system that is robust yet intricate and standardised but task dependent. A system the performance standards of which has taken decades to refine, and a system that will require to be implemented across the world merchant fleet in a comparatively short period of time.

With any new technology, skill or system, there is a thirst for knowledge in the marketplace and a deficiency in the available number of practitioners who can provide it. Typically good practice takes time to develop and document to a standard where it can be used by others. However, in the case of ECDIS use and training, there are a number of Circulars that have been issued by IMO:

IMO information papers on ECDIS:

- IMO_SN_Circ_207_Difference between RCDS and ECDIS (07 Jan 1999)
- IMO_SN_Circ_213_Datums (31 May 2000)
- IMO_SN_Circ_010_Guidance on ECDIS Training using Simulators (11 Jun 2001)
- IMO_SN_Circ_255_Additional Datum Guidance (24 Jul 2006)
- IMO_SN_Circ_266_Rev 1_Maintenance of ECDIS (22 Oct 2007)
- IMO_SN_Circ_276_Transition from Paper to ECDIS (10 Dec 2008)
- IMO_MSC_Circ_1389_Procedures for Updating Shipborne Navigation (07 Dec 2010)
- IMO_MSC_Circ_1391_Operating Anomalies Identified within ECDIS (07 Dec 2010)

It is recommended that all users of ECDIS read all of these.

shippingregs.org / REF.DOCS

IMO-ECDIS

This 37pp Consolidated Research PDF can be found by going to: shippingregs.org and selecting REF.DOCS



IMO 1.27 ECDIS MODEL COURSE

Current ECDIS training is based on the IMO Model 1.27 ECDIS course, which was published in 2000. Training providers that adhere to that course are teaching an old course which, if not updated to reflect developments and improved knowledge in the intervening years, will not reflect the current practice of seamen.

There will be training providers that have never used an ECDIS at sea, that deliver an academic course rather than one that adds real practical value and application. It can, therefore, be seen that flag States, ship operators, inspectors, auditors and seafarers should be aware that although an ECDIS course may state that it is based on the 1.27 model course, it may not actually reflect realistic navigational practices employed when using ECDIS.

Realistically, knowledge gained through trial and error does occur in shipping, as it does in many other industries. The inherent risks in adopting new systems and processes, such as the case with ECDIS, can be reduced where on-the-job training takes place (ie at sea). However, if that is not available, the quality of the initial ECDIS training provided is even more significant in helping to foster safe onboard digital navigation procedures.

Note/. It is expected that a revision of this IMO Model ECDIS course will be issued in the near future. It will incorporate the training criteria stipulated within the Amendments to STCW from the Manila conference that was held in June 2010.

IMO STCW MANILA AMENDMENT – ECDIS RELEVANCE

The revised edition of STCW that incorporates the amendments from the STCW Manila conference are scheduled to be published in June 2011 and will become effective from 1st January 2012. Interpretation of these changes indicate that ECDIS training requirements will coincide with the SOLAS implementation of ECDIS onboard ships.

The following interpretation of ECDIS training requirements are based on a 'draft' of the Manila Amendments:

Expected STCW ECDIS training requirement as of 01 January 2012:

The amendment includes ECDIS as a required competence and stipulates a training requirement, both at operator and managerial level, for deck officers serving in all vessels fitted with ECDIS.

The following three tables within the amendment clearly state the competence and training required:

TABLE A-II/1

Specification of minimum standard of competence for officers in charge of a navigational watch on ships of 500 gross tonnage or more.

Function: Navigation at the operational level

Column 1 (Competence): Use of ECDIS to maintain the safety of navigation. Note: Training and assessment in the use of ECDIS is not required for those who serve exclusively on ships not fitted with ECDIS. These limitations shall be reflected in the endorsements issued to the seafarer concerned.

TABLE A-II/2

Specification of minimum standard of competence for masters and chief mates on ships of 500 gross tonnage or more.

Function: Navigation at the management level

Column 1 (Competence): Maintain the safety of Navigation through the use of ECDIS and Associated navigation systems to assist command decision making. Note: Training and assessment in the use of ECDIS is not required for those who serve exclusively on ships not fitted with ECDIS. These limitations shall be reflected in the endorsements issued to the seafarer concerned.



TABLE A-II/3

Specification of minimum standard of competence for officers in charge of a navigational watch and for Masters on ships of less than 500 gross tonnage engaged on near-coastal voyages

Function: Navigation at the operational level

Column 1 (Competence): Plan and conduct a coastal passage and determine position. Note: Training and assessment in the use of ECDIS is not required for those who serve exclusively on ships not fitted with ECDIS. These limitations shall be reflected in the endorsements issued to the seafarer concerned.

Both Part A of STCW, from where these three tables are extracted, and Part B, which covers training and assessment in the operational use of ECDIS, now contain detailed guidance on when and how ECDIS training should be conducted. These clearly indicate a requirement for ECDIS training for all personnel who serve onboard a ship that has an ECDIS fitted, whether that ship is currently required carry ECDIS onboard or not.



FLAG STATE TRAINING GUIDANCE

It remains to be seen how flag State training guidance will be updated to reflect the STCW Manila Amendments in Tables A-II/1 - A-II/3. However, current consensus suggests a requirement for ships that use an ECDIS as their primary means of navigation will consist of:

- Generic ECDIS training to satisfy STCW – in accordance with a flag State approved and/or based IMO 1.27 ECDIS course.
- Type-Specific ECDIS equipment training to satisfy ISM Code requirements.

Note/. Trickle down training, where a small number are trained within the company or onboard each ship to share their knowledge with others, is specifically stated as not being acceptable by the MCA.



Specific guidance on ECDIS is available within:

- UK MCA MIN 405_Training for ECDIS as Primary Means of Navigation (Jan 2011)
- Singapore MPA Circ 03/2011_ECDIS for Ships and High Speed Craft (Jan 2011)
- Bermuda Shipping Notice 010/2011_Introduction to BNWAS and ECDIS (Jan 2011)
- Australia Marine Notice 15/2010_Carriage and Use of ECDIS (Oct 2010)
- Marshall Islands Marine Safety Advisory 07/09_ECDIS Training needs

shippingregs.org / REF.DOCS

GUIDANCE-ECDIS

This 16pp Consolidated Research PDF can be found by going to: shippingregs.org and selecting REF.DOCS

While clearer training requirements are now being issued there are outstanding questions over certain issues which, if any ship operator is unsure about, they are recommended to obtain clarification from a specialised consultant or direct from their flag State to avoid costly retraining and/or possible detention of vessels.

The following are some examples of questions that a ship owner will need expert advice on:

- Is computer based training (CBT), where it is provided as the sole training method for a generic STCW IMO 1.27 ECDIS certificate, currently accepted, or will it be in the future, to satisfy the Manila Amendments?
- Is CBT, where it is provided as the sole training method for a type-specific ECDIS equipment certificate, adequate under ISM for the OOW to safely operate the system fitted as required?
- When type-specific training is required – to what extent do new software versions affect this requirement?
- If the STCW Manila Amendments require ECDIS training for all deck officers serving on a ship fitted with ECDIS, when will such officers need to have conducted this training. Will it be just prior to having their Certificate of Competency revalidated or over the course of 5 years post 01 Jan 2012?
- What criteria does the paragraph “Each Party shall ensure that instructors, supervisors and assessors are appropriately qualified for the particular types and levels of training or assessment of competence of seafarers either on board or ashore, as required under the Convention, in accordance with the provisions of this section.” actually entail within the Manila Amendments for the purposes of becoming an ECDIS trainer? How will this be appropriately managed?



CONCLUSION

The list of training issues are extensive and this article doesn't touch on equipment or data shortfalls. However, I believe that it is important to bear in mind that although the term ECDIS was created in 1985, the first performance standards were issued in 1995 and that ECDS was accepted in SOLAS as a replacement for paper charts in 2002. Therefore, the Maritime world is still very much at the beginning of its shift into the digital age.

It is a basic fact that it is the responsibility of a single person to ensure that they know what they're doing and that person is the OOW as ECDIS operator.

To put many of the training issues in context, in March 2011, I was aware of 32 manufacturers that I understand sell an 'ECDIS'. These include: Adveto, Consilium, Dalian LandSea, Danelec Marine, DMU China, e-MLX, Furuno, GEM, Headway Marine Technology, Imtech, JRC, Kelvin Hughes, Kongsberg Maritime, L-3 Navigation, Maris, Navico, Navmarine, Northrop Grumman Sperry Marine, Offshore Systems Ltd (OSI), PC Maritime, Raytheon Anschütz, Rutter Technologies, SAM Electronics, Samsung, Sea Information Systems, Simrad, Sodena, Telko AS, Tokyo Keiki, Totem plus, Tracom Technologies and Transas.

With such a range of systems, and the likelihood of more systems to come in the future, there are benefits to having the same system across a fleet of ships, as this will significantly ease the management burden for training, inspections and onboard use. However, the shipping company does have to ensure that it's fit for purpose and adequately supported by the manufacturer, or your selection may be to the company's detriment! Not forgetting the sanity of the officers who will have to use the system!!!

Training is just the start of it. There is much more to ECDIS than simply knowing what it stands for; the creation and ongoing development of safety management of such a critical piece of navigational equipment is vital, which is why proper initial and onward ECDIS training should not be taken lightly. Consider that even if an ECDIS is fully set up and working, think about operating truly worldwide, how to navigate in areas of no known datum or no ENC's, the employment of relative navigation techniques, how to safely use and cross check all the data sources, including safely interpreting and using all the possible sensors - the RADARs, AIS, LOG, ECHO sounders, GYRO's, alternative positioning systems, additional use of overlays such as weather, ice, tide, etc – link them all together within integrated bridge systems, power management systems, autopilot or even automatic track control and then consider the effect of all of this on an inadequate bridge team.

‘ECDIS NAVIGATION IS NOT A CHANGE IN NAVIGATIONAL PRINCIPLES IT'S A CHANGE IN NAVIGATIONAL SKILL,

BIOGRAPHY



PETER THORNTON
Master Mariner and Yachtmaster



Peter Thornton is a Master Mariner and Yachtmaster. Employed by the Royal Fleet Auxiliary (RFA) in 1995, he has enjoyed a high profile and successful start to his seafaring career. He was the first RFA officer to become the Flag Lieutenant to the First Sea Lord, finished top of one of the most intensive courses in the Royal Navy (RN) 'The Specialist Navigator's Course' and was the first RFA navigator to attain digital accreditation. He went on to navigate ships paperless before taking on the prestigious sea training post as RFA Staff Navigator to Flag Officer Sea Training in which he was involved with training, assessing and developing traditional and digital navigation procedures within the RFA, RN and visiting foreign navies. Having been fortunate to sail in ships and yachts in four out of the five oceans, the Arctic is the only one that eludes him so far! In March 2010 he left the RFA to become one of three directors developing ECDIS Ltd, an organisation that delivers international flag State digital navigation training and consultancy.

Peter's main commitment across 2010 and 2011 was to write 'The ECDIS Manual' which was published in April 2012 by Witherby Seamanship International (See pages 22-27). Of particular importance to Peter and ECDIS Ltd is his seagoing currency, which sees him returning to sea as required to help ensure that ECDIS Ltd remains at the forefront of digital navigation practices. Peter is also a freeman of the Honourable Company of Master Mariners, a committee member of the SW branch of the Nautical Institute, an associate fellow of the Royal Institute of Navigation and a member of the Royal Naval Sailing Association.

IMPLEMENTATION

IMPLEMENTATION FOOD FOR THOUGHT FROM ECDIS LTD

- ⦿ ECDIS or ECS? For an ECDIS to be an 'ECDIS', it must contain an IMO type approval certificate. Otherwise it is an ECS and not a legal or recognised replacement for paper charts.
- ⦿ Most ECDIS systems work very well without GPS (as taught on the 1.27 course), but not all. Does yours?
- ⦿ An ECDIS only requires one continuous positional system, one heading input and one speed input. Redundancy is a separate issue. Without an independent heading and speed, you may find your ECDIS to be 'illegal' as a replacement to paper.
- ⦿ How accurate/reliable is the charted information in use? If a lead-line survey is converted to a brand new ENC, just because it's colour and S52, does it mean it's true?
- ⦿ Are you interrogating the zone of confidence? How are you checking the Source Data Diagrams on ENCs?
- ⦿ How accurate is the general datum correction applied by the ECDIS? Are there large variations in the vicinity?
- ⦿ Can you use a GNSS to navigate on charts without a known datum? Are you trained in how to do it safely?
- ⦿ Does your ECDIS have an automatic Data Transformation tool?
- ⦿ Does your system receive Loran C and does it convert this position to WGS84?
- ⦿ How and when do you check the GPS position?
- ⦿ How do you monitor NAVWARNINGS? Is a user file up to date and displayed at all times?
- ⦿ Are you able to view a T+P notice on both raster and vector charts?
- ⦿ Have you got a software maintenance system in place to remain IMO compliant with the latest standards?
- ⦿ Is the term 'presentation independent of data' really understood? If not you are buying into danger.



TRAINING

Flags vary in the standard of certification required. Consideration should be given to onboard training courses, such as the ECDIS Ltd 40 hour 1.27 mobile training option (if accepted by Flag), to save on travel, accommodation costs and separation of crew. Costs vary between companies from €500 to €3500 per head for a 1.27 course. Often CBT is more expensive than experienced 'human' training on board. Most flags don't accept CBT as legal certification, but it can be very valuable in continuation or refresher training.

Contrary to popular belief, there is a surplus of good quality and professional training. It's purely a question of whether the ship or owner is willing to pay for it. Companies such

as ECDIS Ltd train every week, worldwide, often on board, including type specific training to a very high standard and yet they report a few gaps in their training calendar. It is vital to ensure that your old certificates that state the word 'ECDIS' on them actually satisfy your Flag's requirement for 1.27 5 day training. You may also have to consider attending a course to revalidate, depending on Flag requirements.

Full IMO 1.27 courses are 40 hours long (full 5 days). Type specific or familiarisation training is often based around 1 day, but could be substantially more or less depending on the previous standard of 1.27 generic training. The best solution is to complete both at the same time, but this may not always be possible. (www.ecdis.org)

AVAILABLE SYSTEMS

FEATURES/COSTS

FALSE ECONOMY FOOD FOR THOUGHT FROM ECDIS LTD

- Will buying the cheapest ECDIS prove cost efficient overall when you add their training solution?
- If you operate in RCDS mode, can your ECDIS show RNCs? Not all can.
- Is it a licence for life or do you have to pay to renew?
- Are the ECDIS updates free?
- Will the route planning functions save money on fuel (auto divide great circles, using integrated environmental data)?
- Will the manufacturer provide 'spare' licences or charge for replacements?
- Will future sensor integration be expensive?
- How reliable/available is support and at what cost?
- Can it actually navigate to your standard?
- How often will the software change, requiring more type specific training?
- Can it show all data forms, including pay-as-you-go charting?
- Will an unreliable system cause delay in charter?
- How much extra manpower time will be required to 'manage' a complex and unreliable system?
- Are additional sensor integrations free or optional extras?
- Will the manufacturer remain in business with suitable support post purchase?
- Will your ECDIS work just as well without GPS as it does with it?

Bottom Line - There were 33 manufacturers in 2009, and 26 in 2012. The systems all vary, some considerably, in both functionality and price. You don't necessarily 'get what you pay for'. Often the cheapest ECDIS on face value will cost you more from other budgets further down the line. Before you buy, put the kettle on, and seek independent advice.

AMENDMENTS

TO COMPANY ISM AND SHIP SMS

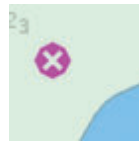
The key to success is not just buying the right ECDIS. It must be supported by the right training and safe implementation into the vessel's procedures. As a historical comparison, the introduction of ECDIS could be said to be as significant as putting steam-powered engines and propellers on sailing ships. The comfort blanket of the much loved and respected paper chart is fast disappearing and being replaced with a digital

equivalent. Some embrace this new technology and others fear it. It is therefore not surprising that the rapid advance of this new technology means there are large numbers of ships navigating with paper charts and ECDIS, or in historical parlance, navigating with sails and engines. This will no doubt continue until adequate training, equipment efficiencies and trust in ECDIS equipment warrant the removal of 'sails'.

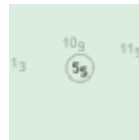
ECDIS Ltd recommend the Witherby Seamanship International 'ECDIS Procedures Guide' as a basis to begin the journey. However, some extra points to consider are listed below.

ISM AND SMS FOOD FOR THOUGHT FROM ECDIS LTD

- What data products can your ECDIS utilise?
- If you do not have sufficient coverage of ENC's, do you have sufficient RNC's? Do you have an ECDIS that can show RNC's? If not, how do you manage in RCDS mode?
- If using RNC's, you are in RCDS mode and you will require an 'appropriate' folio of paper charts in accordance with IMO Circular 207. (www.ecdisregs.com)
- What is your Flag State definition of 'appropriate' folio of paper charts? (www.ecdisregs.com)
- The operator must ensure the system prioritises the correct chart data type (ENC then RNC). Know how your system prioritises data - best scale or type?
- Do you have an adequate feed of information from nav aids, such as NAVTEX, and a system in place to plot it on the ECDIS? If so, do you require such a connection?
- How effective is the anti-virus firewall? If operating ECDIS and a virus prevents the ship from sailing (or worst case causes an accident) the decision to link to the internet will soon be questioned.
- Will the system cease safety monitoring for the period it is updating?
- What is the cost of updating via internet connection?
- Will the system automatically highlight new updates so the operator can view their relevance relative to the planned route?
- Does your team understand fully the chart symbology now used and what is your internal policy for continuation training. For example:



Wreck - Dangerous wreck / Obstruction - Depth unknown / Rock - Underwater, awash rock. Could be depth unknown or value of sounding known - only when interrogated. Separate to depth contour.



Sounding 5.5, reported, unreliable/therefore will not show up with safety contour.

SOME ECDIS LTD ADDITIONAL ROUTE PLANNING FOOD FOR THOUGHT

- Screen into 'large' or 'planning' screen format.
- Orientate the chart to show the beginning and end of the route to get an overall feel for the route.
- Create a blank canvas by hiding all old routes, constructs etc.
- Begin with waypoint plotting in the general area of the start and end of the route.
- Select either Rhumb Line or Great Circle route etc.
- Zoom in to a more appropriate scale to modify the start and finish waypoints and 'massage' waypoints to account for TSS etc.
- Ensure that you have adequate XTD for the various legs of your route to take into account the nature of the environment and expected possible deviations, lateral separation from the route and collision avoidance.
- Check Zones of Confidence (ZOC) or Source Data Diagrams and amend the route or highlight as necessary.
- Set Safety Depth and Safety Contour values.
- Conduct a system check of the route at an appropriate XTD to allow for deviations, collision avoidance etc.
- Once all alarms have been checked and verified, check the route in its entirety on 1:1 scale by manually scrolling along it.
- Add relevant additional information and manual corrections.
- Double check Distance/ETD/ETA and Tidal Constraints.
- Protect the route as necessary and save a back-up.
- If updates are installed prior to sailing or during the execution of the route, ensure that the route is checked again, as updates may affect it.

Cost

COSTS INVOLVED:

- Purchase
- Fitting
- Updating - software and hardware
- Chart purchase and updates - systems and costs (eg pay per use)

Remember - Buying an ECDIS can often be like buying a brand new car - everything is an optional extra. The window price often doesn't include the metallic paint and alloys.

HARDWARE/SOFTWARE

- Is there an ECDIS system that best suits your class of ship, eg predominantly deep water or pilotage, or both?
- What is the cost of fitting?
- Where are the vessels going to be fitted (fit cost may vary depending on location)?
- What screen size do you require for the display?
- What are the requirements for display power, housings and brackets?
- What is the support package available?
- How long does the warranty last?
- Will the systems be networked on an LAN?
- Do you want an additional remote terminal for planning or emergencies?
- Do you need repeats in the Master's cabin, charthouse or navigator's cabin?
- Do you need a repeat in the machinery control room for MARPOL purposes?
- Do you need specific planning software?
- Do you require conning and docking functionality?
- Do you require navigation tools such as Predictor and Trial Manoeuvring?
- Do you require an electronic logbook function?

- How much are additional software licences if required for head office use?
- How much are the inevitable upgrades to the software and presentation library?

INTEGRATION

- Do you require integration with a bridge Alarm Management System?
- Can it integrate with existing sensors such as GNSS, Log, Gyro and Echosounder?
- Can it integrate with existing Radar and provide Radar Image Overlay (RIO)?
- Can it integrate with NAVTEX?
- Can it integrate with the existing autopilot or Track Control device?

Remember that the Performance Standards for ECDIS (IMO A.817(19), revised by MSC.232(82)) state that, as a minimum, ECDIS should be connected to the ship's position fixing system, to the gyro compass and to the speed and distance measuring device. Note that for ships not fitted with a gyro compass, ECDIS should be connected to a marine transmitting heading device. When connecting to additional sensors, ECDIS should not degrade the performance of any equipment providing sensor inputs, and the connection of optional equipment should not degrade the performance of ECDIS below the set standard.

There's enough on your mind when your ship gets underway...

...without worrying about your ECDIS

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www.ecdis.org 01489 559 677

Call us today for free advice on IMO ECDIS requirements for your vessel



Pages 12-15 contributed by:

Mark Broster
 BA(Hons) FInstLM AFNI AFRIN
 Managing Director
ECDIS Ltd

IMPORTANT SAFETY NOTICE

ABOUT THE RELIABLE OPERATION OF ECDIS

Following an announcement by the International Maritime Organization (IMO) concerning potential display anomalies in some ECDIS systems (see IMO MSC Circ 1391), the International Hydrographic Organization (IHO) issued an ENC Data Presentation and Performance Check in October 2011. This check is intended to assist mariners and to help determine the extent of the issues. Reports from sea received by the IHO confirm that a number of manufacturers' ECDIS fail to display some significant underwater features in the "Standard" display mode. In order that all significant objects are visible to the mariner, these ECDIS must be operated in "Full display" or "All display" mode until a software upgrade is made available by the manufacturer. Mariners are strongly recommended to use the IHO ENC Data Presentation and Performance Check issued through ENC service providers and also available directly from the IHO website (www.iho.int) to check the operation of their ECDIS and to determine whether their system is affected.

JRC ECDIS: The Japan Radio Co. Ltd (JRC) has confirmed to the IHO that earlier versions of its ECDIS will not display some types of wreck and underwater obstructions (including stranded wrecks) in any display mode. This means that these models of JRC ECDIS must be used in conjunction with paper charts in order to ensure that all wrecks and underwater obstructions can be identified by the mariner.

JRC has issued a notice alerting its customers to this problem available at:

<http://www.jrc.co.jp/eng/product/marine/whatsnew/20100526/index.html>

Mariners using JRC ECDIS should use the IHO ENC Data Presentation and Performance Check to determine whether their system is affected. If it is affected, then the JRC ECDIS should be used in conjunction with paper charts until an equipment software upgrade is available from JRC. Mariners should contact JRC or their JRC equipment support organisation to arrange suitable remedial action.

Source IHO Circular Letter CL33/2012 issued 14th March 2012

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EXTRACT FROM JRC NOTICE:

The Wreck symbol is not displayed on the JRC ECDIS regardless of the display mode.

As shown in the figure below the Wreck depicted by the symbol showing a portion of hull or superstructure in a sea area that is deeper than the safety contour when using "ENC" or "C-MAP Ed2.0" is not displayed.

Please be aware of this phenomenon when operating the equipment and verify by other means such as the use of paper charts.

Since the publication of CL33/2012, further action has been taken by JRC, that will be reported to the Maritime Safety Committee of IMO 16-25th May 2012. This will confirm that upgrade software patches are now available from JRC for all the systems affected. As a result, as well as updating the IMO on the latest situation, the IHO will shortly issue another CL. This may result in States amending or withdrawing certain aspects of the NAVAREA warnings that were issued as a result of CL33.

For further information please contact:

Japan Radio Co.,Ltd.

Marine Electronics Business
Department (Japan)
Tel: +81-3-6832-1812
Fax: +81-3-6832-1845

Amsterdam Branch Office

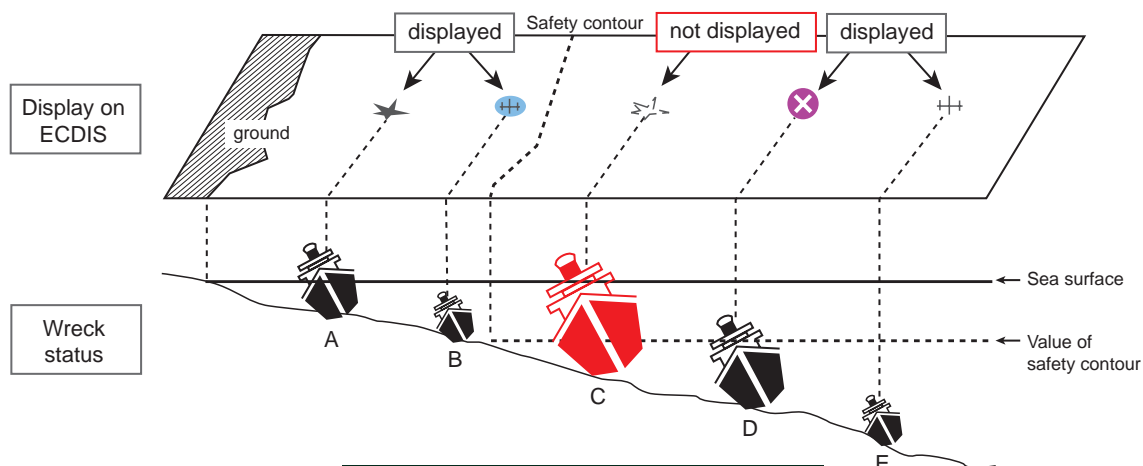
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ECDIS PROCEDURES GUIDE



These procedures provide recommendations that are designed to accompany a ship's safety management system (SMS) for the use of ECDIS for navigation, route planning and at sea on passage.

PRICE £75



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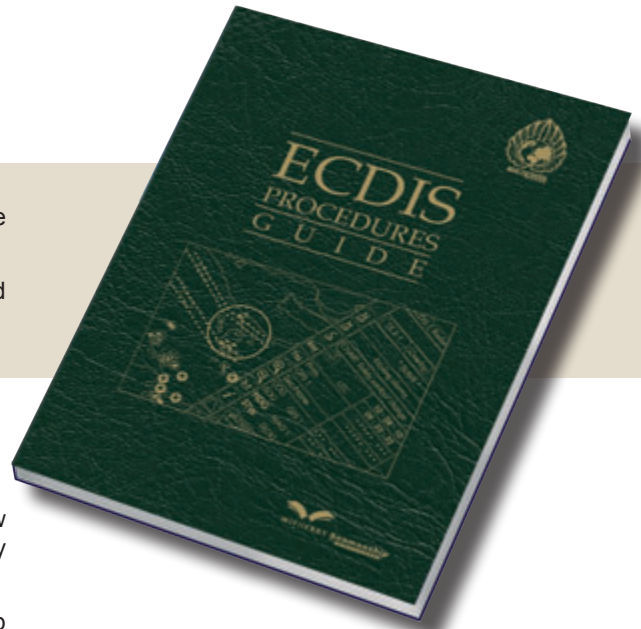
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ECDIS PROCEDURES GUIDE

In March 2012, Witherby Publishing Group published the 'ECDIS Procedures Guide' authored by ECDIS Ltd.

Pages 18 to 21 of this special report is based on text extracted from the 'ECDIS Procedures Guide'.



INTRODUCTION

1.1.1 These procedures provide recommendations for how ECDIS should be configured and used as a ship's primary means of navigation.

To achieve compliance with international regulations, a ship may navigate with ECDIS as the primary means of navigation if:

- Sufficient official data adequate for the intended passage is installed (ENC and RNC)
- the installed ECDIS is type approved
- a second type approved ECDIS is installed as a backup (or there is a full paper chart backup)
- adequate generic and type specific training has taken place
- any additional requirements laid down by Flag State are fulfilled.

Additionally, a ship may navigate paperless if:

- It is utilising ENCs to fulfil the chart requirement (ie official vector charts only).

1.1.2 Providing it is used correctly, ECDIS provides enhanced navigation, situation and spatial awareness when compared to navigating using traditional paper charts. It is a system that is capable of displaying the past, present and future position of a vessel by utilising all available sensor information. However, the techniques required to use ECDIS differ in part to those required when using paper charts and as such they must be understood if they are to replace paper charts without a loss of safety. To achieve the requirement for safe ECDIS navigation, the following must first be achieved:

- All officers in charge of a navigational watch are to have conducted adequate generic and type specific ECDIS training
- the use of high quality and up to date chart data and maintenance of such data
- the use of all available sensors and navigation aids to support accurate, safe navigation and prevent the over reliance on any one sensor

- the use of all available techniques including but not limited to visual and radar fixing to prove GNSS correct
- the ability to utilise an accurate Dead Reckoning (DR) and Estimated Position (EP) in the event of GNSS equipment failure
- the use of Safety Depth and Safety Contour values to emphasise the limits of safe water
- safe configuration of ECDIS to suit the environment and conditions.



EQUIPMENT

1.3.1 The type approved ECDIS units fitted are capable of displaying the full range of official electronic charts in conjunction with fused navigation sensor information (if not, then the capabilities and limitations of the equipment are to be documented and fully understood).

Each console will also be capable of independent operation and is provided with Uninterruptible Power Supplies (UPS) to ensure continued operation in the event of short power failures (time of UPS determined by MSC 232(82) and SOLAS Ch II-1 1974). Two ECDIS units are fitted to each vessel.

SYSTEM CONFIGURATION AND MAINTENANCE

1.4.1 ECDIS is only as accurate as the information contained within it, whether from sensors or installed data. Therefore, it is critical to the accuracy of the system that it is configured appropriately prior to sailing.

1.4.2 The Navigator is to ensure that the systems are configured in accordance with these recommendations with special regard to chart priority, sensor offsets, ship specific data and security settings such as passwords and restricted menu access.

1.4.3 The Navigator is to ensure that all appropriate charts for the area of operation are installed and updated. All chart updates are to be logged in an appropriate manner and the systems annotated with the number of the latest update installed. Following an update, a check of the intended route is to be conducted as well as an appropriate spot check of the entire folio of installed charts.

1.4.4 The Navigator is to ensure that a backup of system data is conducted at regular intervals. System maintenance such as virus checking and defragmenting should be considered following consultation with the manufacturer so as not to invalidate the warranty.

1.4.5 The Navigator is to ensure that the systems are configured so that it is possible to reconstruct the ship's track from recorded ECDIS data.

1.4.6 The ECDIS terminals should be given the prefix Primary or Secondary ECDIS. The Primary ECDIS is to be configured as the Master unit, with the preferred GNSS selected as the primary position source and alternative GNSS input as its secondary. The Secondary ECDIS should be configured as a mirror image of the Primary ECDIS. However, if two GNSS systems are available, it is a consideration that both systems use a different input for primary position source as this allows the monitoring of both GNSS inputs at any given time. Where a secondary GNSS position source is not available, the next best position source is to be selected. As a minimum, the Primary unit must have the alarm sound set to ON, and should display charts at the best scale.

1.4.7 Guidance on settings and configuration of ECDIS is provided in this document. However, this does not affect the Captain's prerogative to augment or reduce safety settings as the navigational situation dictates, with suitable risk management measures and supervision in place.

Such deviations from standard practice are to be stated appropriately in the relevant OOW instructions or Sea Order Book.

1.4.8 Like all computers, ECDIS software is prone to malfunction if it is not shut down in a controlled manner. Failure

to do so may result in loss of data and failure of the system to restart. The operator is to ensure that the ECDIS software is shut down first in accordance with the manufacturer's guidance before powering down the system.

USER GUIDE

1.7.1 The manufacturer's user guide is to be available on the bridge in both hard and soft copy. The soft copy is to be installed on all ECDIS and available on screen via the relevant shortcut key or associated menu structure. A printed version of the user guide is also to be available.

CHARTING AND RCDS MODE

1.5.1 All units are to carry an outfit of up to date electronic charts that provides adequate coverage of the intended operating area at an appropriate scale. Official chart data, derived from government authorised Hydrographic Offices, is to be used for safe navigation. Official chart data is to include Electronic Navigational Charts (ENC) and may also include Raster Navigational Charts (RNC) and official paper charts. If utilising RNCs for navigation then ECDIS is in Raster Chart Display System mode (RCDS) and an appropriate portfolio of paper charts is to be carried in line with IMO Circular 207 'Differences between RCDS and ECDIS', or as required by the individual Flag State.

1.5.2 Where possible an ENC is to be used. However, when operating in areas without ENC coverage or when a suitable scale ENC is not available, RNCs or paper charts are to be used. The hierarchy for selection of electronic charts within ECDIS should be such as to use the best scale of corrected chart available, and thereafter as follows:

- ENC
- RNC (corrected paper backup available)
- paper charts.

It should be noted that the best scale chart available in ECDIS may be an RNC if such data is installed and therefore the operator is to be fully aware of the requirements and limitations of RCDS mode.

1.5.3 The requirement for an appropriate portfolio of up to date paper charts is stated in IMO Circular 207 'Differences between RCDS and ECDIS'. However, the IMO does not define the word 'appropriate' and as such does not specify the size or content of the portfolio. Instead, this is the responsibility of the Flag State. The Navigator is to be fully aware of the requirements of Flag with particular reference to ordering, holding, updating and availability of appropriate paper charts in this regard.

1.5.4 All ECDIS are to be kept fully up to date so that each system contains the same updates with regard to Notices to Mariners (NTM), Temporary and Preliminary Notices to Mariners (T&P), Navigation Warnings and manually applied updates in the form of Manual Corrections.

RCDS MODE

3.15.1 The OOW is to be mindful that, when the system has RNC as well as ENC data installed and the operator configures the system to choose the priority of data automatically, the system will select the best scale chart and this may be an RNC. The OOW is to know the limitations of the system when in the RCDS mode of operation. The OOW is to know the criteria for which data is selected for display by the system and any limitations that may be imposed as a result of doing so.

3.15.2 Where possible, an ENC is to be used. However, if an appropriate scale ENC is not available, an appropriate scale RNC is to be used.

An appropriate portfolio of paper charts is to be available and up to date in accordance with IMO Circular 207.

3.15.3 There are many limitations when using an RNC. Of particular note are the following limitations when in RCDS mode:

- ⦿ RNCs cannot automatically activate alarms to warn that a vessel is about to cross a Safety Contour or a specified area
- ⦿ an RNC cannot be interrogated for automatic route checking although manually inputted dangers should be highlighted
- ⦿ objects on RNCs cannot be interrogated to display any additional information
- ⦿ displayed information may be difficult to read if displayed in anything other than North Up
- ⦿ RNCs are distorted as a result of being over or under zoomed, as they are designed to be displayed at a specific pixel density
- ⦿ charted information displayed on RNCs may be more difficult to view if on anything other than the Day Bright palette.

3.15.4 RNCs contain a header file that includes some additional information over and above what is shown on a paper chart. The most significant information in the header file is the datum shift needed for the plotting of WGS 84 positions onto charts based on another datum.

Datum shifts can be applied to WGS 84 positions and directly displayed upon the chart using the shift appropriate to that area and chart as determined by the relevant government authorised Hydrographic Office. Where the difference between the local horizontal datum and WGS 84 is known, an adjustment should be automatically applied by the ECDIS. If the horizontal datum of the paper chart from which the RNC is produced is not known, it is not possible to relate GPS positions accurately to the RNC. IMO SN Circular 255 has been issued to alert users to this problem.

3.15.5 ECDIS operates in WGS 84 Datum, and automatically shifts charts with known non-WGS 84 Datums so that they are displayed to the user in WGS 84. However, in cases where the original charted datum is uncertain or unknown, shifting charts to match correct known positions is possible manually by offsetting GNSS. Conducting a Manual Datum Shift is potentially dangerous, is always subject to errors of unknown magnitude and should not normally be attempted. It is only to be carried out with the Captain's approval.

3.15.6 If a chart with an unknown datum is encountered, operator fixes should be used to fix the ship's position.

RECOMMENDED ECDIS DISPLAY SETTINGS FOR PILOTAGE AND CONFINED WATERS (DAY):

AIS	On	All Depth Contours	On
ARPA	On	Seabed	On
EBL	On	Four Shades	On
VRM	On	Shallow Pattern	On
Scale Bar	On	Use SCAMIN	On
Range Rings	Off	Full Light Lines	Off
Tides and Currents	On*	Highlight Info	Off
Spot Soundings	On	Show Correction	On
Isolated Dangers	On	M-Quality Objects (ZOC)	Off
Names	On	National Names	Off
Cables and Pipelines	On	Show Outdated	Off
Buoys Names	On		
Other Info	Off		

* Consideration should be given to the use of official Tides and Current data where available.



FAMILIARISATION

The Basics

2.1 Determine how to switch the ECDIS on and off.

- a. Establish what settings are saved in the event of a system crash and what must be restored.

2.2 With regard to the ECDIS software and hardware, establish the following:

- ⦿ Screen Layout Options
- ⦿ Controls

- ⦿ Screen Display
- ⦿ Cursor control
- ⦿ User Interface/Menu Navigation
- ⦿ Shortcut keys/keyboard shortcuts
- ⦿ Hardware controls and switches
- ⦿ Quickest method of displaying ownship position
- ⦿ Single operator action keys for MIO and Standard Display setting.

2.3 Identify all automatic functions required for monitoring ship's safety such as the display of position, heading, course, speed, depth, safety values and time.

2.4 With regard to data, determine how to do the following:

- ⦿ Set system units
- ⦿ Scroll
- ⦿ Zoom
- ⦿ Centre on ship
- ⦿ View cursor data
- ⦿ Determine Scale of charts
- ⦿ Select the Best Scale Chart
- ⦿ Select Autoload and Autoscale
- ⦿ Select a particular scale.

2.5 Determine how to access the main menu and select menu options.

2.6 Establish how to interrogate an RNC and charted features of an ENC.

Presentation of Data

2.7 Determine how to set and display the following:

- ⦿ Day, Dusk and Night palettes
- ⦿ Brightness and contrast
- ⦿ Specifically for ENCs:
- ⦿ Safety Depth and Safety Contour
- ⦿ Shallow and Deep Contours
- ⦿ Two and Four depth shades
- ⦿ Traditional and Simplified symbology
- ⦿ Select Base, Standard, All Other and any Custom or Additional display
- ⦿ Configure display settings
- ⦿ Save configured settings
- ⦿ Display of Zone of Confidence (CATZOC) information

2.8 Establish how to display ECDIS Chart 1.

Safety Settings

2.9 Establish how Alarms and Indications/Warnings are generated and where they are displayed.

2.10 Establish how to acknowledge an Alarm, Indication/Warning.

2.11 Establish where an Alarm, Indication/Warning can be reviewed once acknowledged.

Charts

2.12 Determine how to install licences, permits and charts on the system.

2.13 Determine how to ascertain whether an installation was successful.

2.14 Determine how to access the Chart menu and differentiate between different chart products installed.

2.15 Determine the system criteria for automatic selection of charts.

2.16 Determine how to select a chart for display.

2.17 Determine how to check the update status of loaded charts.

2.18 Determine how to update both RNC and ENC charts on your system.

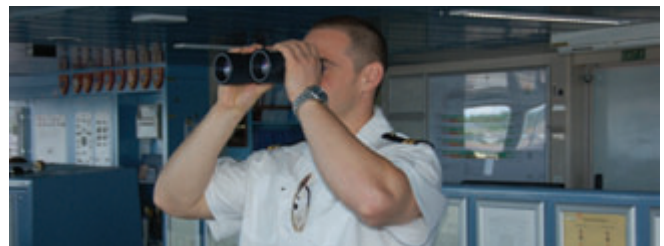
2.19 If available, determine how the system automatically updates and what the consequences are when it is updating.

2.20 Determine how to apply Manual Corrections/Updates.

2.21 Determine how to find and view Corrections, Updates/NTMs.

2.22 Determine how to view AIO and T&P overlays.

HANDOVER ROUTINE



3.18.1 While on watch, the OOW is responsible for the operation and management of ECDIS. Therefore, a comprehensive handover of the system is essential before taking over the watch. If the offgoing or oncoming OOW is in any doubt about the state of the ECDIS configuration, the Navigator should be consulted immediately.

3.18.2 The OOW is to annotate on the ECDIS console the configuration in force, that is to say whether it is set up for Confined Waters, Coastal or Open Ocean (see Annex E). The oncoming OOW is to check the system setup to view any changes or errors in setup.

3.18.3 When taking over the watch, the OOW is to confirm the position of the ship by taking a Manual Fix. Wherever possible, this fix should be by means independent of the Primary Position Source such as but not limited to visual or radar and the use of RIO if available.

3.18.4 As a minimum, the following checks and actions are to be conducted upon watch handover:

- ⦿ Ensure that the correct Display setting is shown
- ⦿ ensure that the correct Route is loaded in Route Monitoring
- ⦿ ensure that the secondary Route is loaded in Route Editor (if required)
- ⦿ if in True Motion, check that the Look Ahead is configured correctly
- ⦿ verify that the Safety Depth and Safety Contour settings are configured correctly
- ⦿ ensure that the Anti Grounding Cone is set for the prevailing conditions
- ⦿ ensure that XTD is applied and displayed correctly
- ⦿ ensure that Vectors are configured correctly
- ⦿ ensure that the chart in use is on the best scale
- ⦿ ensure that the chart is the most recently corrected ENC available from installed charts
- ⦿ interrogate the quality of data and review all Chart Notes
- ⦿ fix the ship's position on ECDIS and prove ECDIS correct
- ⦿ sight the ECDIS check-off cards
- ⦿ ensure that the ECDIS Management Card is up to date
- ⦿ repeat the above steps at the Secondary ECDIS terminal
- ⦿ if in RCDS mode, confirm the geodetic datum in use
- ⦿ if in RCDS mode, view the source data diagram and review all Chart Notes
- ⦿ if in RCDS mode, ensure that paper backup is correct.

THE ECDIS MANUAL

Pages 22 to 26 of this special report is based on text extracted from the 'The ECDIS Manual' The manual is about sharing best practice and ensuring that the transition from 'sail to steam' is efficient and safe. The principles of navigation have not changed, but the art of navigation has. With the right training and to some degree the right ECDIS, you can replace paper charts with an ECDIS in all operating conditions - even when GPS is unavailable, contrary to common misconception!



The ECDIS Manual consist of three parts:

- Part 1, this is the main part of the manual and is 450 pages in length, and the following extract is taken from (pp 275-280) which is Section 10.3.5 Route Monitoring
- Part 2, is 286 pages in length and covers the main published guidance on ECDIS, from flag states and maritime safety organisations
- Part 3, is 82 pages in length and is the data from ENC Chart 1, which is the symbol guide for ECDIS.

10.3.5 Route Monitoring



Apart from a proper plan in the first place, the key to navigating with an ECDIS is being able to know how it can help and how to quickly operate specific functions to extract the information desired.

In the same way that a paper chart is used with navigation equipment to create a masterpiece of carefully constructed pencil lines and figures to determine the estimated position of a vessel, the ECDIS should be able to be manipulated and controlled for the same user purpose to ensure positional reliability and navigational safety.

There are two main aspects of ECDIS route monitoring:

- Safety/chart settings
- position monitoring.

10.3.5.1 Safety/Chart Settings

- Safety depth
- safety contour
- feature sets – standard/customised (pilotage/coastal)
- sensor integrated overlays as required (radar/AIS)
- user created overlays (danger lines/clearing bearings/notes/text/areas/nav plan info)
- additional data format overlays – dependent upon operation, number of ECDIS screens available and the effect on display of core navigational information (images/maps)
- optimum scale.

10.3.5.2 Position Monitoring

- Screen setup (look ahead or position offset/full, split or standard screen/show or hide information panels and toolbars/multiple ECDIS options – data format/command/operator/overview)
- orientation (true/relative motion)
- primary/secondary position sources (PPS/SPS) – GNSS/e-Loran/radar overlay/manual fixes (DR/EP).

10.3.5.3 Main Screen

Select the most appropriate display and orientation for situational awareness.

As a standard, the position monitoring screen will be the main operating display, but there will always be a need to 'look away' or search to obtain information that is not within the screen area that contains the ship's own position.

Every ECDIS should be capable of doing this swiftly and be able to return to the ship's position within one click at any time.

Possible reasons for needing to 'look away' are many but, as an example:

- Identify fixing points, nav marks, references, etc
- cross check position by selecting fixing points
- cross check position by radar overlay on land or fixed conspicuous objects.
- interrogate objects that are expected or can be seen visually.
- check nav plan/route
- planning.

System Examples:**Transas**

Navi-Sailor is a multi-window application to flexibly organise chart views to suit the tasks in hand.

For example, you can open new chart windows for the following:

- To look ahead by displaying the vessel position on a smaller scale chart than the position monitoring chart

- to view the approaches or harbour charts for your destination
- to plan new routes or chartpoints.

While you are carrying out any of the above, you can still view the position monitoring window. You can choose how chart windows are displayed from the control panel. They can be cascaded, tiled or individually sized.



Figure 10.152 Transas normal nav screen

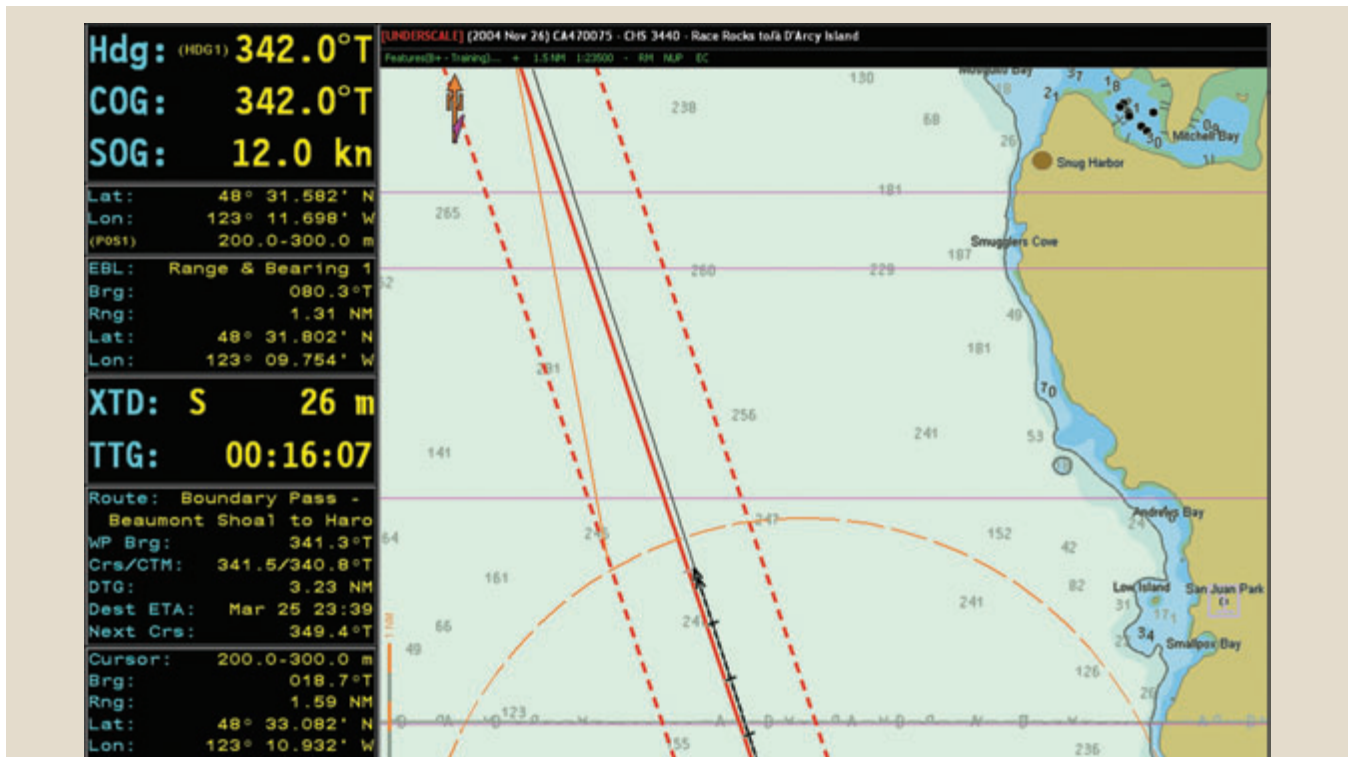
OSL

Figure 10.153 OSL normal nav screen

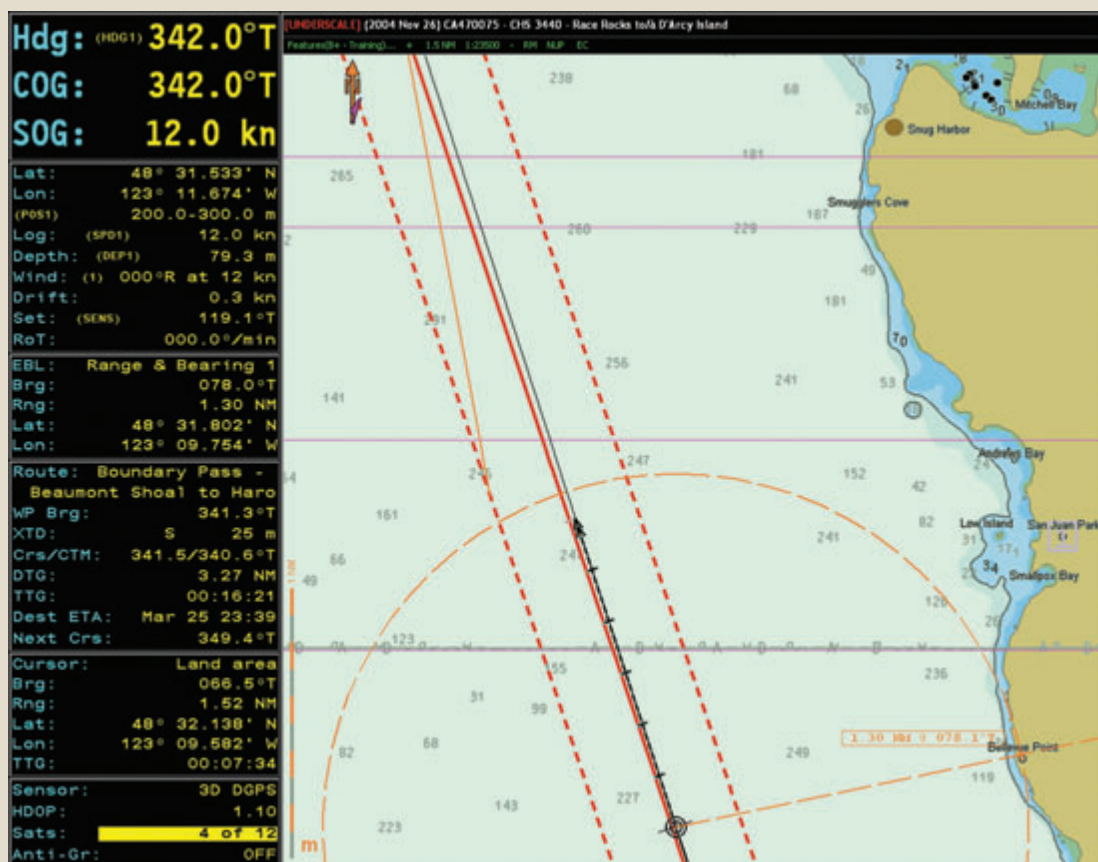


Figure 10.154 OSL detailed nav screen



Note the extra sensor information in the control panel on the left. Similar to other ECDIS screen layouts and sensor information, information panels are software version dependent.

PC Maritime

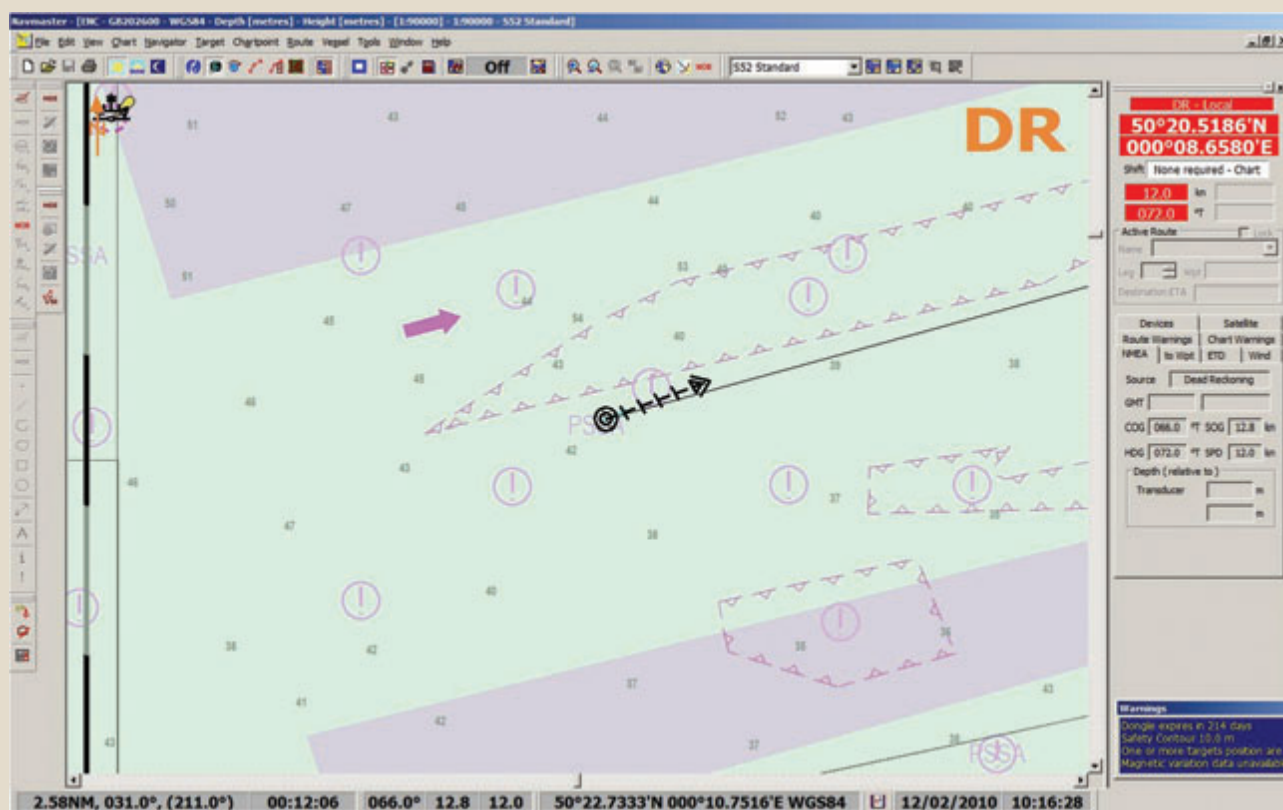


Figure 10.155 PC Maritime position monitoring window

A dedicated window is automatically allocated to monitor the vessel position, by default, at the largest scale chart available. The system changes chart automatically when necessary. This window cannot be minimised or closed if position input is active.

To move away from this area, position monitoring must be disengaged, which allows you to scroll ahead or view another chart.

10.3.5.4 Look Ahead/Position Offset

One of the most frustrating elements of using an ECDIS (and particularly a single ECDIS) is trying to look at where the ship is going, on a suitably sized screen and at the right scale to see all the features and dangers.

Two ECDIS on the bridge vastly improves the ability to look ahead by monitoring own ship at the correct scale on the primary ECDIS without reducing window area, at the same time as getting an overview of the chart from the other ECDIS.

If restricted to a single ECDIS, the operator must work the system to their best advantage. An ECDIS operator who can navigate around the screen quickly to zoom in and out with ease makes a difference, but there is also an option to make use of the 'look ahead' or 'position offset', similar to using a radar.

A look ahead distance can be set that forces the position monitoring window to display a chart with a set distance from the vessel to the edge of the chart window, in the direction of travel.

This option is often very useful for RCDS and RNCs that are not seamless, because they cannot be scaled without losing clarity. It also prevents the vessel being plotted up to the chart border before changing to the next chart.

For example, in open water you might set look ahead to 10 nm, while in confined waters 0.5 nm may be more appropriate.

PC Maritime

You can set a look ahead distance via a set of buttons and function keys that force the position monitoring window to display a chart, or scale a vector chart, with a set distance from the vessel to the edge of the chart window, in the direction of travel. This option is for RNCs that, because of their raster format, cannot be scaled without losing clarity. It also prevents the vessel being plotted up to the chart border before changing to the next chart.



Figure 10.156 PC Maritime voyage toolbar

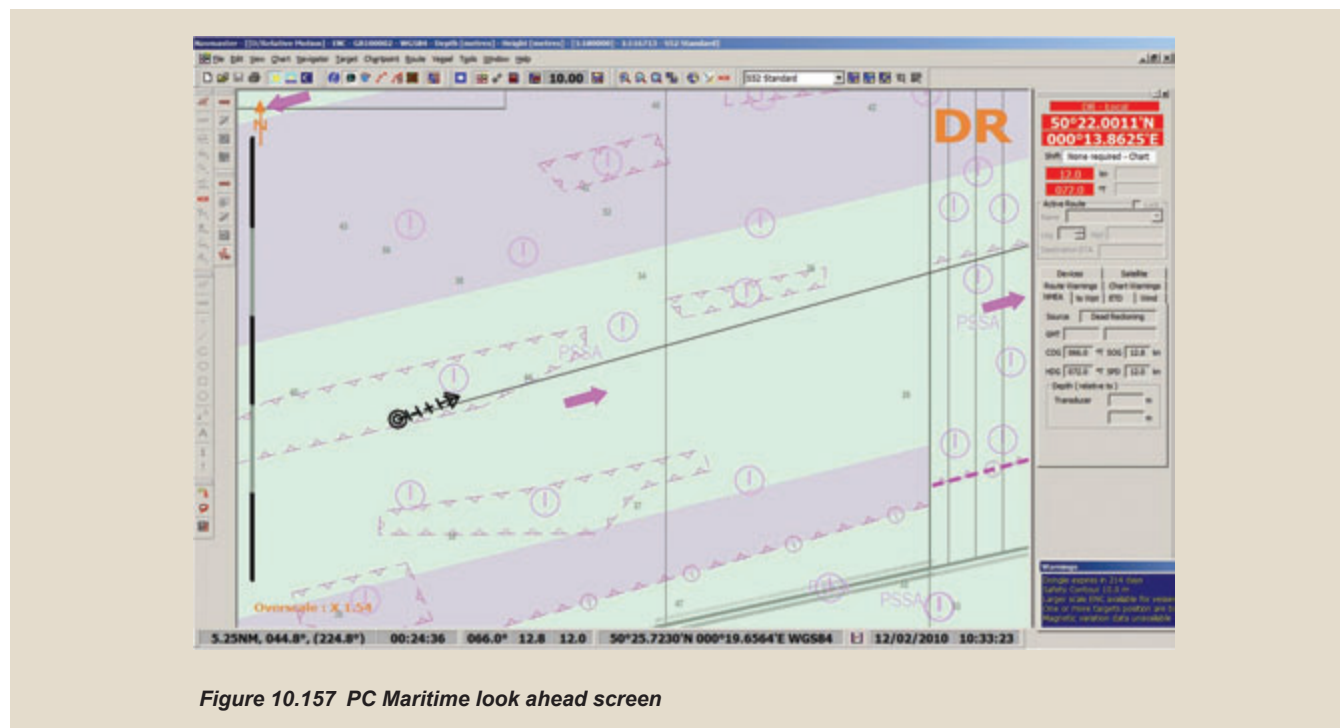


Figure 10.157 PC Maritime look ahead screen

Note: If you change chart or scale in the position monitoring window while look ahead is active, the look ahead value is overridden to match the new chart scale.

Kelvin Hughes

This is another example of a menu system and options for look ahead or position offset.

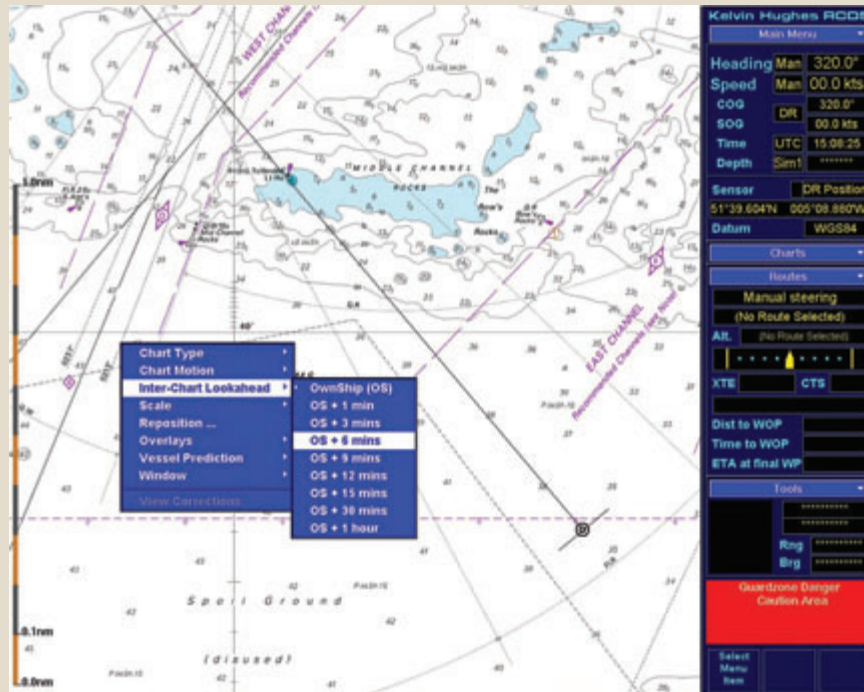


Figure 10.158 Kelvin Hughes position offset

10.3.5.5 Split Screen

Even with look ahead options, a major frustration of electronic chart systems is that the amount of chart you can display at the right scale (optimum or 1:1) is limited by console screen size.



On average, the portion of chart visible to a user on an ECDIS in optimum scale is a tenth of what you can see on a paper chart.

If there is only a single ECDIS, this issue can be overcome to some extent by split screen options. Open a second chart window to display the area around the vessel at smaller scale (although this then halves the amount of chart seen at optimum scale).

Depending upon the system, it may be possible to split the screen horizontally or vertically, the choice of which, if remaining in north up orientation, will depend on the main direction of travel.

For example: If vessel course is mainly east/west – split horizontally; if north/south – split vertically.

Transas

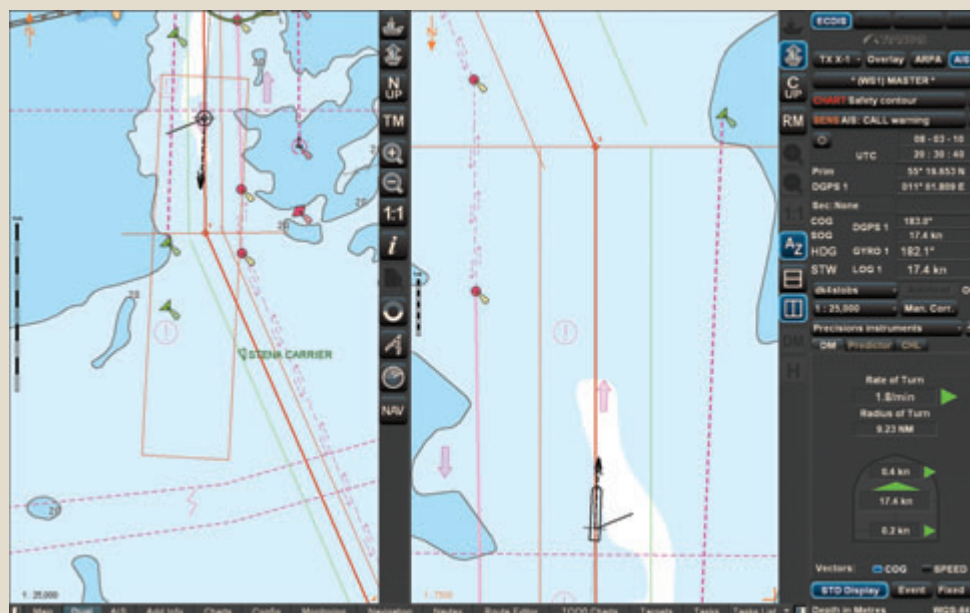


Figure 10.159 Transas split screen vertical

INTRODUCTION

TO THE ECDIS ARTICLES

During May 2012, we contacted a number of individuals across the world of shipping asking them to share their thoughts on what ECDIS means for shipping, and as you will see over the coming pages the level of response gives a comprehensive body of opinion of what mariners believe is ahead of them.

For all, it is the biggest change in the operation of a ship's navigational bridge in their careers. It offers tremendous benefits for the ship and should allow a much greater appreciation of the navigational hazards, and allow officers more time for conning of the vessel from the front of the navigational bridge, but this benefit is offset by the concern of over-reliance on ECDIS and the loss of many navigational skills that have indoctrinated navigators to cross-check each fix, verify and double check by all available means, and because ECDIS looks bona-fide plotted digitally on-screen in real time, there is the concern that it will be blindly accepted by many.

In addition to the many articles we received, we also received emails and phone calls from those who were travelling and did not have time to compile an article, but had thoughts that they wanted to share. These included:

IMPACT AND CHANGE

Significant both in financial and operational terms as companies will have added costs in an already depressed market to fit ECDIS and train their staff. The confidence to make that step from paper to digital may also lead to confusion as companies keep their paper charts onboard as back-up, that could lead to errors if the paper charts (that are now back-ups) are not corrected. Many readers will have experienced the problems of ships that have carried passage charts or have been on a specific run for months or years and not corrected their global portfolio of charts and then have to re-activate them, and it's always in a hurry! We heard cases where companies have implemented a main and back-up ECDIS, and have added the additional provision of a reduced chart portfolio acting as a 'get you home set', though it was felt that many operators will not be doing this.

TRAINING

This is a huge concern. It is generally accepted that younger officers will be fine with the system, but it will be more of a transition for more experienced officers. Onboard training and appropriate familiarisation is a must. The issue of type-specific training is regarded by some as overkill, particularly where the industry has failed to standardise controls and symbols on ECDIS. You just have to recall how much easier the operation of the different radar sets you have sailed with over the years was made with standardised radar symbols.

BENEFITS

Used properly it will be a huge asset. Just think of the difference navigating a vessel through the congested waterways of the world such as the Dover Strait or Singapore Straits where for large portions of the passage where you are plotting the vessel's position at 6 minute intervals. Each time, it takes 15-30 seconds to take the fix, another 15-30 seconds to write it down and a further 60-90 seconds to pop round the back of the chart table to plot that position. This does not include the time for changing charts, assessing the next course or re-checking what navigational challenge is up ahead of you. It does not leave much time for looking out the front windows! ECDIS should double the available time for collision assessment and watchkeeping. Which navigator would not wish for such a scenario!!!

CONCERNS

These were numerous, from loss of awareness, distraction from watchkeeping, the variety of systems, quality of training and the need for Masters to develop standing orders for ECDIS, such as those that are proposed in 'ECDIS Procedures Guide' on pages 18-21, with particular focus on the stages of the passage and alarm set points.

Then there is the concern of navigating blindly, particularly if the ECDIS is switched to passage planning mode and set-points are adjusted that differ from the stipulated or expected parameters for the vessels current voyage, or not understanding the data that is presented, particularly if layers are removed or hidden.

In addition to the many individuals we heard from who have trained and served as ships navigators and in many cases as Master, we heard from a former Chief Engineer who gave a tremendous insight in to a non-navigators view of the changes that are happening upstairs:

"Along with ship inspections, I do many vessel audits where I actually sail with the ships. During those times, the course of my work has led to many in depth conversations and observations of what goes on on the Bridge while the vessels are underway. I think, for those vessels fitted with an ECDIS, there is a MUCH greater reliance on the electronic charts than on the paper version. All vessels are quick to point out that the electronic chart is just an "aid", while the paper charts are the primary means of navigation. But I believe this is said just to keep vetting inspectors happy".

The bottom line is that ECDIS is a tremendous tool, but proceed as wise navigators have always done, with caution.

TYPE SPECIFIC TRAINING

With numerous ECDIS systems on the market, and the need to meet the requirements of the ISM Code, some shipowners still appear unconcerned that their multi-million dollar assets are navigated by officers who have received little or no training in the very system introduced to improve safe navigation.

Many ship operators have introduced type specific training via the equipment manufacturer, training centres or dedicated onboard trainers. However many are content to follow the 'trickle down' training method, ie relying on untrained officers training fellow officers. Whilst discouraged by some flag states, others do not specify how this type specific training should be delivered. Without this guidance (and considering the zero cost to deliver this training) some ship operators have chosen to take this route.

This trickle down training generally consists of completing a checklist of items, sometimes delivered during a crew change by the person being relieved. This training can never be

standardised, does not guarantee that all relevant information is transferred, and may be delivered during a busy and stressful period for the trainee.

Over the course of ship inspections and audits, I have observed that some bridge officers, holding generic ECDIS certificates but with no formal type specific training, could not access information from the ECDIS (such as how to set up the anti-grounding alarms). In some cases, the 2nd Mate was the only watchkeeper on board with any knowledge of the lesser-used functions of the system.

Shipowners and managers must not hide behind the lack of guidance provided by flag states and should explore options other than the least cost, least effort approach. With the advent of 'ECDIS related groundings' it is worth bearing in mind that effective training may cost money, but a grounding will prove far more expensive ●



Capt Duncan Bruce

Marine Assurance
Superintendent

**INEOS Marine
Assurance Service**

“ too many ship operators are content to follow the 'trickle down' training method, relying on untrained officers training fellow officers ”

A VIEW OF ECDIS

FROM THE AUTHOR OF 'NAV BASICS'

Advances in technology are bound to bring about changes in navigational instruments fitted on today's modern ships. One such change is the mandatory requirement to carry an Electronic Chart Display Information System (ECDIS) by July 2018. The argument to mandate ECDIS has been to improve safety through enhanced situational awareness. However, does it really improve safety? That question remains to be fully answered.

In simplistic terms, yes it does BUT only if operators are fully aware of its capabilities and limitations and utilise it appropriately. In contrast to paper charts combined with traditional printed publications where one source of information is accessed at any one time, ECDIS is a multifaceted 'Computer Based Information System' consisting of several instrumental and user inputs, with outputs usually provided on one display. Whilst the integrity of hardware and associated electronic inputs can be ensured through various checks and performance standards, the integrity of human inputs will always lead to 'as you sow so shall you reap'. This issue is further complicated by variations in operator competencies to construe displayed information, leading to problems collectively referred to as 'human factor'.

As per STCW's explicit training requirement, ECDIS operators must possess 'a thorough knowledge of and ability to use navigational charts and publications' and in addition must 'complete both generic and ship specific equipment ECDIS training'. However, accidents such as the groundings of the

CFL Performer (12th May 2008) and CSL Thames (9th August 2011) show that the issues relevant to human error will continue to present challenges. Operator complacency can be one cause, but knowledge decay for traditional navigational methods cannot and should not be ignored. The ECDIS is heavily reliant on GPS - a system operated by one organisation with no fully operational alternatives at present. Even though it is very unlikely, what if the GPS became unavailable? Moreover, use of GPS has caused a significant 'expertise erosion' in the use of sextant for position fixing, whereby we now find fewer navigators who can comfortably 'fix' their ship's position by using sextant. What is the alternative if the ECDIS on a ship failed completely, particularly on ships with no paper back-up?

It is not that these questions have not been considered before mandating the ECDIS, but that answers to these questions do not seem to 'convert' the hardcore navigators who have always relied on traditional paper charts. Consequently, a full acceptance of ECDIS will continue to face challenges, but until then all concerned MUST be vigilant if the objective of improving safety is to be fully met. This will include cross verification of information displayed on ECDIS display by using traditional methods to continue building confidence. Furthermore, technology cannot replace human interaction capability, hence perfection in the use of ECDIS can only be obtained through training, practice and then more practice followed on by due diligence at all times ●



Abdul Khaliq

Principal Lecturer,
Maritime & Offshore Safety

**Warsash Maritime
Academy**

“ technology cannot replace human interaction capability, hence perfection in the use of ECDIS can only be obtained through training, practice and then more practice ”

THE DEEP SEA PILOT'S VIEW OF ECDIS

All British deep sea pilots have a minimum of five years' command experience, hold a valid Master Mariners certificate and are licensed annually by Trinity House. They are employed on a voluntary basis by shipowners who value the contribution to safety of navigation that pilots can make. This contribution is particularly appreciated by the Masters of container ships and car carriers who, because of their fast port turn round times and number of ports during a typical European schedule, would have problems complying with hours of rest regulations. However, all types of vessels, including tankers, bulk carriers and passenger, regularly use our services to help mitigate fatigue levels and assist with passage planning.

Deep sea pilots are only allowed to operate outside of mandatory pilotage areas, and as such we normally "take the con" of vessels between the pilot stations. We have a unique view of how bridge teams operate away from the view of Port State Control, away from the view of the office and also subtly when the Master is not on the bridge.

One of the major challenges of ECDIS implementation is the need for the development of a different mind-set. Traditionally all navigators were taught to always have the largest scale chart available on the chart table. Unfortunately because of the minimum size of monitor allowed (270 mm x 270 mm) this concept must be re-evaluated. One advantage of paper charts is that it is possible to look beyond the boundaries of the passage plan to get an overview of the area being transited.

Because of the reduction in sea time with which an OOW can now hold a certificate, there is often a lack of background knowledge and experience. For example, I witnessed one second officer put the position on the paper chart (as required

by the SMS) by transferring a range and bearing of an aid to navigation straight onto the paper chart from the ECDIS. Previously any junior officer could have referred to a senior with questions about "navigation issues". In my experience that is no longer the case.

Many of the initial causes for concern with regard to ECDIS implementation were answered with the statement that the problems would be overcome by proper training. Unfortunately many training providers do not have practical hands-on experience of using equipment on board. When monitoring internet forums about ECDIS, I have been amazed by some of the questions asked by "ECDIS trainers", one example being "why can't we use ARC charts for ECDIS?" I have yet to come across an officer who can show me how to plot position lines onto an ECDIS.

Many newbuild vessels from the Far East are fitted with full ECDIS systems, but all the ones I have worked on still rely on "paper charts" as the primary navigation source. It is usual to see fully compliant ECDIS monitors supplied with a homemade laminated instruction "For reference only" or "For training purposes only".

The need for generic and type specific training for ECDIS is well documented, but in my opinion the marine industry (with the exception of manufacturers) will rue the lack of standardisation of equipment. The adoption of at least an "S-mode" or default setting is so glaringly obvious.

Unfortunately the "Nintendo generation" place a total trust on the information shown on the screen, not appreciating that the information displayed is only, at best, as accurate as the source data used for paper charts ●



Capt Kevin Vallance MNI

Licensed Deep Sea Pilot

Member of UKMPA Technical
& Training Committee

UK Participant Member of
EMPA e-Nav Working Group

“one of the major challenges of ECDIS implementation is the need for the development of a different mind-set”

ECDIS

A BRIEF MASTER'S VIEW

Whenever I find myself about to criticise the proliferation of electronic nav aids, I think of those who were at sea in the days of sail watching the advent of the steam engine. They too must have wondered what would happen if the engine failed, which is why they continued putting sails on steam ships for a long time.

I just wish the electronic chart system had been around when I was a second officer. I tend to look back at my hundreds of hours spent correcting charts that were years out of date as one of the unpleasant parts of my seagoing career. Having said that, I became very used to every symbol and nuance of the chart and, by the time I became a senior officer and Captain, I could glance at the chart and read it like a book. This was very useful!

I am willing to wager that the majority of officers at sea today still would prefer paper charts before an electronic system. However, like radar, it has arrived and, like it or not, it will become standard on ships. As in the early days of radar, it will be misused and, through that misuse, accidents will occur. It must and will be improved but, until then, I can fully understand the desire to have paper charts as a standby.

Hard legislation regarding the design of systems must be made. The screens must be large enough to contain all the information presently shown on the paper charts, rather than the unsound layering technique, which is an accident waiting to happen. Why are the manufacturers allowed to continue to produce unintelligible volumes of instructions and sets so different from each other that the training is really required for the operation rather than understanding of the system?

The heart of the ECDIS system is a computer, usually run on windows. This means that, if it behaves the same way as my present laptop, it is subject to freezing and crashing, always at the wrong time. Not a good idea when taking your ship without a pilot through the Bosphorus at night.

In other words, I support the electronic chart system but recognise it is early days and that officers must have time to familiarise themselves with it and not feel forced to use something that they still have reservations about.

The chart table will still be required a little while longer ●



Capt Michael Lloyd

FNI

“ as in the early days of radar, it will be misused and, through that misuse, accidents will occur ”

ECDIS DISPLAY CONFIGURATION

For all its potential, ECDIS is only computer software running on a marinised PC. As a result, it suffers from all the faults and errors of any computer. The greatest single danger from ECDIS is to assume that it has been correctly configured with regard to the Route, Safety Depth, Safety Contour, Alarms and Displayed Data. A ship can ground just as easily as a consequence of improper configuration as it could from sloppy chartwork on a paper chart.

Where the ECDIS in use supports it, display configurations should be saved so that the system can be set up quickly when transiting between different environments such as Confined Waters, Anchoring, Coastal Navigation and Open Ocean. This will save time when setting up the system.

RECOMMENDED CONFIGURATION FOR PILOTAGE AND CONFINED WATERS

(nomenclature and functions mentioned below are not exhaustive and will vary dependent upon the system in use)

ROUTES

- Check:** Ensure that the correct Route is loaded for Route Monitoring.
- Action:** Check that XTD has been set to an appropriate value.
- Set up ETA.
 - Set up ETD.
 - Confirm that the Route has been checked.
 - Protect the Route.
 - Activate the Route for Monitoring.
 - Load the Secondary Route in Route Editor if required.

WAYPOINT SELECTION

- Check:** Ensure that the correct Waypoint information is being displayed.
- Action:** Check that the following are configured correctly:
- Waypoint Selection Auto or Manual
 - Arrival Circle Auto or Manual
 - Radius Auto or Manual
 - Track History On (set appropriate value)
 - Secondary Track On.

ROUTE DISPLAY SETUP

- Check:** Ensure that the display is configured for Route Monitoring.
- Action:** Configure the following parameters appropriately:
- Headline
 - COG Vector
 - HDG Vector
 - Ship by Contour or Symbol
 - Align by HDG
 - Course/Leg/Speed On
 - XTD On
 - Arrival Circle Off
 - Radius On
 - WPT Names On.

CHART SETUP

- Check:** Ensure that the Chart is configured correctly.
- Action:** Check that the following parameters are configured:
- Chart Motion Relative or True (configure Look Ahead if in True)
 - Chart Orientation North Up, Head Up or Course Up
 - Chart Autoload On
 - Chart Autoscale On
 - Chart Priority ENC.

OVERLAYS

- Check:** Ensure that all relevant Overlays are loaded.
- Action:** Check that the following Overlays are loaded and configured:
- Manual Corrections (load filename as appropriate)
 - Additional Information (load filename as appropriate).

MAIN CHART PANEL

- Check:** Ensure that the Main Chart Panel is configured correctly.
- Action:** Check that an appropriate level of data is available for the execution of navigation.
- Check that the Palette is configured to suit the conditions.
 - Check that the screen layout is appropriate for execution of navigation.
 - Check that all relevant panels such as Route Data are open or available.

TARGETS

- Check:** Ensure that targets are configured correctly.
- Action:** Check that the following are configured correctly:
- ARPA Contacts On, Vectors On, Tracks Off
 - AIS Contacts On, Vectors On, Tracks Off
 - CPA Alarm - Configure as necessary
 - TCPA Alarm - Configure as necessary.

ROUTE ALARMS

- Check:** Ensure that Route Alarms are configured correctly.
- Action:** Check that the following Alarms are configured appropriately:
- End of Route Alarm Off
 - Out of XTD Alarm On
 - Out of Schedule Alarm (configure as necessary)
 - WPT Approach Alarm On (set appropriate value)
 - Off Leg Course Alarm On (configure as necessary).

ECDIS NAVIGATION AIDS

- Check:** Ensure that navigation aids are configured correctly.
- Action:** Check that the following are configured correctly:
- Predictor On, configure as necessary
 - Manual Fixing Available.

RADAR

- Check:** Ensure that the preferred radar is selected.
- Action:** Check that RIO and ARPA targets can be displayed.

TIME

- Check:** Check that System Time is configured correctly.
- Action:** Check that Ship's Time is correct in the ECDIS.
- Check that the correct Time Zone settings are applied.

POSITION SOURCE SETUP

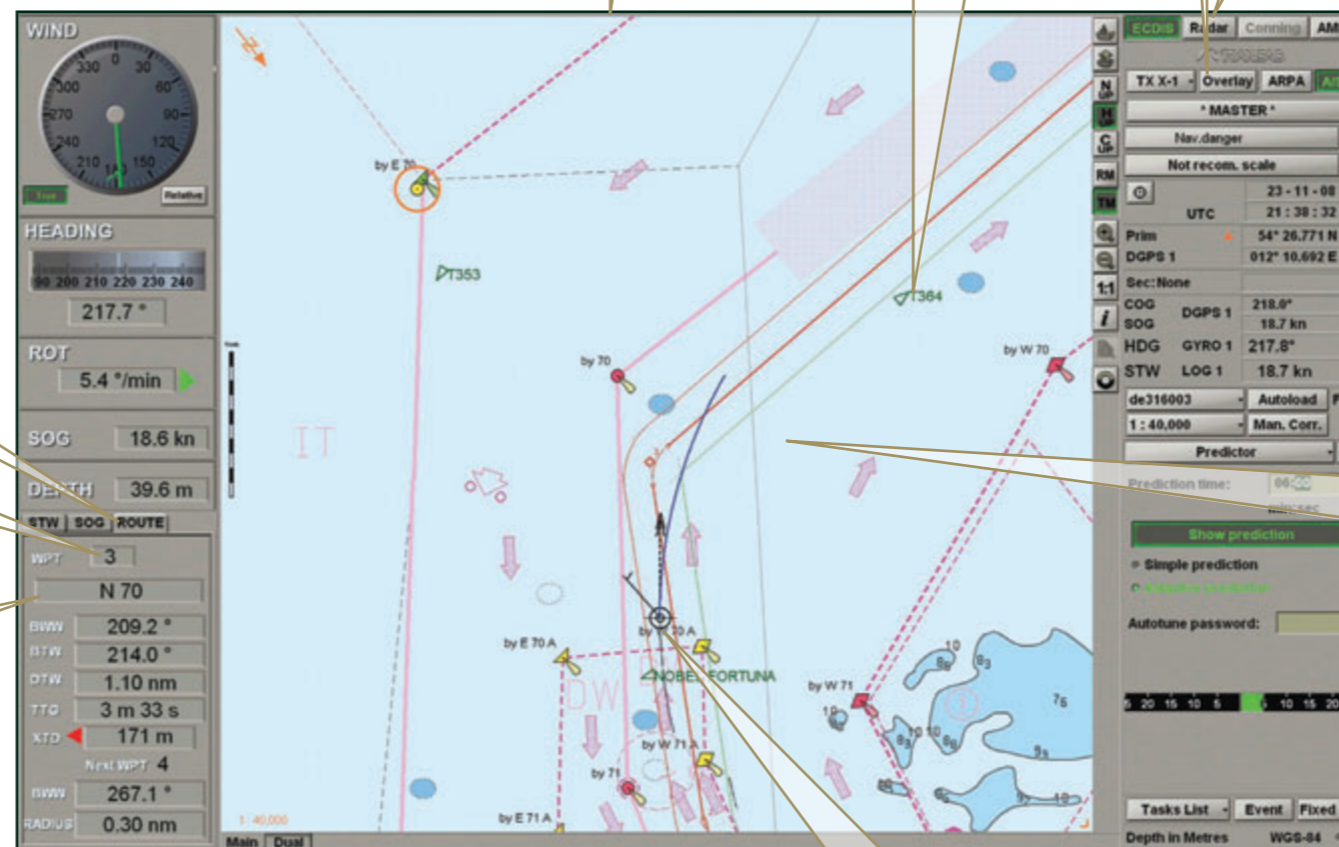
- Check:** Check that the primary position fixing system is set up correctly.
- Action:** Check that ECDIS is correct by inputting a manual fix in the system.
- Select the best available sensor as the Primary Position Source.
 - Select the best available Secondary Position Source.
 - Check Heading reading with ECDIS readout.
 - Check Log reading with ECDIS readout.
 - Set SOG or STW as speed source.
 - Confirm that Radar Information Overlay (RIO) is available and prove ECDIS correct.

LAYERS SETUP

- Check:** Ensure that the chart is configured correctly.
- Action:** Check that the display of layers is configured appropriately:
- Display Category Standard + or Custom (or equivalent).
- Consider displaying the following layers:
- Spot Soundings
 - Isolated Dangers
 - Names
 - Cables, Pipelines
 - Buoys' Names
 - Other Info
 - All Depth Contours
 - Seabed
 - Scale Bar
 - Navtex.

SELECT SYSTEM UNITS

- Check:** Ensure that System Units are configured correctly.
- Action:** Set up System Units for:
- Large Distance
 - Small Distance
 - Speed
 - Depth
 - Time Zone.



These extracts are from section 3 of the 'ECDIS Procedures Guide' and have been illustrated for this article on a Transas ECDIS screen. The appearance of the Transas ECDIS screen is for illustration only and does not constitute endorsement by Witherby Publishing Group.

THE BESPOKE CBT DEVELOPER'S VIEW OF ECDIS

Advancement in technology is inevitable and an essential part of progress and it must be embraced for its benefits. But like any new change, including that brought in by ECDIS, it should be embraced with due precautions, proper training and risk assessment. Here is some food for thought.

Having two ECDIS, should it be a reason to make paper charts redundant? A well-polished sextant still brings pride to the watch and connects us to our maritime traditions, and so would paper charts. ECDIS has its strong advantages, but should it be an immediate substitute for paper charts? Slower transition, giving appropriate time for adaption, would be prudent.

With a variety of ECDIS models available, besides generic training, providing members with model specific training is posing a challenge as well as concern. Most companies have 3 or 4 different types of ECDIS models on board their fleets. Standardisation of key features and implementation of similar models should be looked into by both manufacturers and companies. At the same time, ship specific ECDIS training should be a mandatory part of onboard familiarisation before the Navigator assumes his duties on the bridge.

Updates of electronic charts being offered by manufacturers over the internet are the fastest way to bring in the latest correction, but are we prepared for all eventualities? As a Master, I could always cross validate and revalidate whether my Mate had applied all the T&P corrections accurately. Would I be able to do that now? Are the providers governed by regulations to ensure there are no threats from viruses? Just imagine the most critical navigation equipment becoming redundant due to virus attack!!

The increased functionality of ECDIS versus conventional paper chart navigation means that commercial shipping will see greater safety in the future and improved bridge oversight. However, it is important that traditional navigation skills are not lost and that navigators become confident, but not overconfident, in the use of ECDIS. There is a danger that bridge watchkeepers will increasingly trust what is displayed without question.

Before the IMO official implementation, there have been many incidents due to overreliance or lack of awareness on ECDIS. Take the case of the CFL Performer. The OOW was following the passage plan set on the ECDIS, but unfortunately this track took the ship straight over the Haisborough Sand. Apparently the Master had changed the original passage plan en route. In another case, P&O vehicle and passenger ferry Pride of Canterbury struck a sunken wreck. The ECDIS was not properly configured, and thus a charted wreck did not show on the display.

Words of advice to all Navigators: Train yourself well on the advantages and limitations of ECDIS. Don't overrely on ECDIS; still go out on the wings to take transit bearings. Don't consider ECDIS as a point of consolidation of all navigational information; do cross validate the information on respective equipment and follow the good safe conventional navigation practices and keep your contingencies in place. Don't forget to do all this until systems and staff adapt to ECDIS fully. So keep your sextant polished and paper charts updated at least until 2017! ●



Capt Sanjay Bugnait

CEO

**Core Competency Training
& Services Pvt Ltd**

“ECDIS training should be a mandatory part of onboard familiarisation”

ECDIS CHALLENGES UNLOCKED

BY VIDEOTEL

There is no doubt that the implementation of ECDIS as the primary means of navigation will place enormous pressure on the maritime industry, due to complex training and compliance issues. The lack of a common standard for ECDIS makes the challenge even greater. With significant differences between manufacturers' models, as well as major variances in model and software versions from the same manufacturer - but all complying with IMO Performance Standards - the difficulties of effective and relevant training could not be more obvious. One of the major and continuing issues will also be that experienced seafarers transferring ships regularly will invariably require type specific training on an ongoing basis for some time to come.

With all these issues in mind, Videotel has carefully considered the most practical and flexible way of providing effective learning for seafarers and has joined in a consortium, with partners Safebridge and ETC, to provide a three stage learning solution. Videotel's new and updated EDCIS distance learning course, which will comply with the 2012 IMO Model

Course 1.27, provides a sound mind-set and understanding of the principles of the ECDIS system and how it should be used to facilitate navigational planning. Once this part of the training has been successfully completed, candidates go to an ECDIS Training Consortium (ETC) centre to experience hands-on simulator training on actual equipment in real-time navigational scenarios.

Type specific ECDIS training, which, to date, includes Chartworld, Imtech, JRC, Northrop Grumman, Sperry Marine, Raytheon Anschütz, SAM Electronics and Transas, with more manufacturers to follow, is achieved online.

As time is fast running out, there is, understandably, a real concern among shipowners and managers about the realities of ECDIS compliance. As a training provider looking for the most practical solutions to current maritime problems, Videotel is confident that this joint approach will provide great assurances for those looking for the most cost-effective and relevant crew training to progress and manage the very real challenges that implementation of ECDIS will bring to the industry •



Nigel D Cleave

Chief Executive Officer
Videotel

“ there is, understandably, a real concern among ship owners and managers about the realities of ECDIS compliance ”

ROUND THE HORN WITH ECDIS

The greatest change to affect the maritime industry is without doubt the evolution of the full-blown ECDIS system. It has the potential to pull the shipping industry into the next century, provided that the shortcomings of operational personnel are not permitted to infringe its development.

The awareness for standardised equipment has already been realised alongside the need to formalise training. How this is to be successfully achieved is still questionable. The training of personnel is clearly seen as a major objective. However, variables in training to enable our navigators to use the system in a safe and effective manner are probably the outstanding pitfall.

TUITION METHODS

Training mariners to use digital systems by the antiquated method of one tutor to ten or twelve students will clearly not be effective. Neither can industry assume that everybody is computer literate to a degree that everybody knows everything about system electronics. The majority of young persons, but not all, have a push button upbringing. What they don't have is the experience of the seasoned master to avoid collision.

MOVING FORWARD WITH ECDIS

ECDIS means growth; it can be labour saving and certainly cost effective by eliminating dated chart correction practice and the need to purchase new or additional charts. However, we must manage the experience of today's Masters alongside the parallel of the modern 'hot shot' junior officer.

Long term, these digitised youngsters are moving forward through the industry to become the informed Masters of tomorrow. So any problems of current Masters being unfamiliar with ECDIS today will permeate through the system. The immediate problem is 'now' and the next twenty years, until uniform competence is achieved across all ranks.

DANGERS AS SEEN, OR NOT

Overreliance on digital gadgetry and forgetting the essential 'lookout' content of Rule 5 of the Regulations for the Prevention of Collision at Sea have already been made familiar throughout the maritime environment. For an industry that is based on the first principal of Safety of Life at Sea, not looking out of the window is paramount to being criminal. The new technology has turned navigation on its head. Our passage plans can be formulated with accuracy and ease, provided we do not run over the land between 'Way Points'. We will not stop using the passage plan because of unfamiliar idiosyncrasies. We just have to master the art and manipulation that much better.

QUESTIONS AND ANSWERS

The big question is 'is ECDIS safe in the hands of the Navigator?' Possibly that should read 'is the Navigator safe in the hands of ECDIS?' Perhaps it boils down to the quality of our officers and how we train them within our marine culture.

Do we need ECDIS? Yes, but if it goes wrong, we, the organising authorities, will be at fault, not the serving Master or bridge officer.

We must therefore give our mariners the systems and procedures to absorb the technology, not just to be good, but to be very good at what we do ●



David J House

Master Mariner

Author "Navigation for Masters" / "Seamanship Techniques"

“ the immediate problem is 'now' and the next twenty years, until uniform competence is achieved across all ranks ”

THE IT SPECIALIST'S VIEW OF ECDIS

Mitch Ratcliffe said that a computer lets you make more mistakes faster than any invention in human history - with the possible exceptions of handguns and tequila.

There are always teething problems when a well-established manual process is converted to a computer-based process. And what better example of a well-established process than the century-old paper chart and correction system?

Once an IT system is out of the initial implementation stage, it is easy to start over-relying on it and this is usually when big mistakes are made. However, with the right software, the right training and the right attitude, it is also possible to get much more from the IT system than from the manual process it has replaced.

Before mourning the death of the paper chart, let's imagine the following scenario: after taking a vertical angle with a sextant, you select the observed object on the ECDIS, enter the angle and let the ECDIS do the rest: check the height of the object in the ENC database, calculate the height of tide at the time of observation, do a bit of trigonometry and display a circle of position around the object. Combine this with a visual bearing or maybe even with the line of soundings produced by the echo sounder data for the last hour and you can verify your position without radar or GPS. That's definitely not 'video game navigation' anymore, just good seamanship!

Can we learn something useful on the ECDIS if we just analyse it like another IT system?

On the hardware side, the processing unit is low tech by today's standards. Even complex ECDIS operations are no match for the raw power of the latest processors.

However, the user interface is another matter. Compared to the size of paper charts, ECDIS screens are very small. The performance standards state that "the effective size of the chart presentation for route monitoring should be at least 270mm by 270mm". Common paper charts are 980mm x 640mm, so a 'basic' ECDIS system has no more than 12% of the surface of a paper chart. Relying on look ahead/position offset or split screen functions to cram more information on a tiny display is just not good enough.

In my experience, installing dual screens for all PC users in an office is by far the easiest option to boost their productivity at a low cost, so shipowners should buy the biggest screens they can afford and make sure there is room on the bridge to fit the bigger display devices that should become the norm in the future.

The performance of an IT system depends on the quality of the data, in our case the charts data and the sensors data. I have great admiration for the work of the various Hydrographic Offices, but when adapting tried and tested existing procedures to a new system, errors should be expected. Digitising data also has a perverse effect: data from an old black and white chart based on a 150 year old survey that would have immediately convinced the officer of the watch to be particularly cautious will appear with modern ENC ECDIS symbols exactly like data from a survey last year. Of course the CATZOC (CATegory of Zone Of Confidence of data) information is available, but I have seen many cases of perfectly knowledgeable users trusting incorrect reports produced by computers because "the machine never makes mistakes" which is true ... if the data fed to the machine is correct.

Sensors provide the ECDIS with continuous position fixing, heading and speed information. However, because GPS is affected by sunspot activity and jamming, and the receiver(s) can just fail, users should know what happens if the system loses GPS input.

How many officers are happily using GPS as speed input for ARPA calculations without consciously realising that log (water) speed and not ground speed is necessary to determine the correct aspect of other vessels?

If the GPS signal is lost and the ECDIS continues to show a reassuring dot where the ship Dead Reckoning position is calculated, this could be a recipe for disaster if it goes unnoticed despite the alarm. Again, this is a trust problem. If the machine always shows the ship's position correctly, why should you suddenly doubt the machine output?

Finally, in a world where most users do not even consider opening a manual to learn how to work with a program because all Windows software and all iPhone/iPad apps have a similar interface to interact with users, could we at least provide a common standard basic mode across all ECDIS equipments?

This was discussed for ARPA too and the idea is not intended to restrict innovations proposed by the manufacturers. The idea is just to give access to a button that reverts the whole system to a known simplified standard mode - a godsend if you find yourself alone on watch 30 minutes after a crew change at the buoy off Gibraltar on a totally unknown bridge on the assumption that the Captain knows and trusts you... ●



Johan Machtelincx

I.T. Director

Witherby Publishing Group

“ a computer lets you make more mistakes faster than any invention in human history ”

IMO REQUIRES THAT ECDIS SHALL BE FITTED ON:

- # TECHNOLOGY

REGULATION-

2012 The Manila Amendments to the STCW Convention and Code enter into force on 1st January 2012. Any officers with navigational responsibilities require Flag State approved STCW ECDIS training certification.

THE MASTERS

PERSPECTIVE OF ECDIS

IMPACT OF ECDIS FOR INDUSTRY?

A significant volume of reported navigation marine accidents has been linked to human error caused by elements of fatigue, associated workloads and reduced manning levels. On some ships, reduced manning has demanded that bridge watchkeeping officers have to work longer hours to complete essential duties and to ensure that the safe operational status of their ship is maintained.

The traditional time-consuming method of navigating a ship by the use of paper charts has, if done correctly, been confirmed as a reliable and familiar practice for navigators to conduct passage planning and to monitor a vessel's progress. However, the number of marine accidents may be reduced with the introduction of an electronic navigational system such as ECDIS.

ECDIS is a state-of-the-art navigation aid that can deliver a 24-hour real-time technique of position monitoring. Navigating in confined waters and in ports particularly during periods of reduced visibility is complemented by the use of ECDIS as long as it is integrated with an accurate, reliable satellite position-fixing system. Position monitoring is instant and with the use of other essential navigational equipment it provides continuous and accurate positions of the ship at any time.

Many other provisions are available on ECDIS. For example, when integrated with an Automatic Radar Plotting Aid (ARPA) it can deliver collision avoidance data. Furthermore with the resultant vectors a navigator is able to analyse and determine the best course of action with respect to navigation dangers and proximities to land or shallow depths.

In addition, ECDIS enables the mariner to focus on keeping a vigilant lookout instead of being smothered in chart work and position fixing. Equally, collision avoidance and the anti-grounding features of an integrated system are fundamental to areas where high traffic densities, restricted visibility and confined channels are prominent.

All considered, using ECDIS would positively enhance safe navigation techniques, help prevent marine accidents and safeguard the marine environment.

TRAINING

ECDIS is a useful "navigation aid". An "aid" to navigation and that is all! Such devices should never replace the traditional methods using navigation instruments or distract the OOW from basic watchkeeping requirements.

The basic methods of navigation along with the expected level of competence for bridge watchkeeping officers should always be maintained. It is recognised however that there is a need to provide proper courses for mariners on the use of ECDIS. Undoubtedly the implementation of standard training for the use of this navigation aid could very well reduce the number of accidents given the shortage of experienced navigational officers who are totally familiar with these systems.

Numerous systems are available, all with different menu systems and information capabilities, but with insufficient training their usefulness could be compromised. The need to provide standard courses for mariners worldwide on the use of ECDIS is clearly visible and, with this in mind, the IMO has developed an ECDIS training syllabus under STCW.

ECDIS training is a crucial element to ensure that mariners understand both the capabilities and the limitations of such systems. There is an urgent requirement for the development of accredited courses in accordance with the IMO approved syllabus worldwide.

PLANNING USING AN ELECTRONIC NAVIGATIONAL SYSTEM

Passage planning can be undertaken on an electronic chart display and information system (ECDIS) displaying electronic navigational charts, ENC, subject to Flag State approval.

Raster chart display systems, displaying raster navigational charts, RDC, which are exact copies of paper charts, can be used for passage planning in conjunction with paper charts.

ENC vector charts are compiled by attributing to each chart feature a set of values, and each chart is stored in a layered digital database. The 'intelligence' of vector charts allows three-dimensional safety zone monitoring.

When passage planning using ECDIS, the navigator should be aware that a safety contour can be established around the ship. Crossing of this contour will be automatically indicated by the ECDIS while the route is being planned and executed.

When passage planning using a combination of electronic and paper charts, great care should be taken at transition points between electronic and paper chart coverage. The voyage will generally involve pilotage, coastal and ocean water phases. Planning within one phase should be undertaken using either all electronic or all paper charts rather than a mixture of both types.

When a passage is planned using paper charts, care should be taken when transferring the plan to an ECDIS. In particular the Navigator should ensure that:

- ◎ Positions are transferred to, and are verified on, electronic charts of an equivalent scale to the paper chart on which the original position was plotted
- ◎ Any known difference in chart datum between that used by the paper chart and that in use by the ECDIS is applied to transferred positions
- ◎ The complete passage plan as displayed on the ECDIS is checked for accuracy and completeness before use.

Care should be taken when transferring route plans to electronic navigational aids such as a GPS, since the ship's position as calculated by the navigation aid is likely to be in WGS84 datum. Route plans entered into the GPS for monitoring cross track errors for example must therefore be in the same datum.

The case will be similar with radars. Routes and maps input onto the radar will be referenced to the ship's position. As the ship's position displayed on the radar is typically via a connected GPS, care must be taken to ensure that maps and plans entered onto the radar are created in the same datum as the navigation aid (GPS).

CONCERNS

A Navigator's work is never done! To fall behind with passage plans and then possibly being challenged by a Master who asks for passage times and distances can lead to considerable pressure. Nonetheless, such instances do occur.

Periods of boredom during long passages, or even pressures to complete passage plans, can sometimes lead the Navigator to work on their planning during their watch on the bridge. This is completely wrong and must be avoided, for we all know that:

"Every vessel shall at all times maintain a proper lookout by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision".

With all the applications and device software available on these advanced electronic navigation systems, there is a huge temptation to use and delve into its capabilities. An ECDIS system is not only for monitoring the position of the ship, but is capable of being utilised for planning of future routes at the same time. It is however well known that on certain vessels there is a class requirement to provide an 'ECDIS route-planning device' in addition to the principal ECDIS required by SOLAS. As a former navigator of a world-famous cruise liner where the primary passage planning was conducted on admiralty charts, I wonder whether I would have ever considered planning the next passage on a chart that was already being used. Well the answer to that is NO! Generating to fellow officers a totally misleading, ambiguous and confusing chart representation could have escalated to a possible disaster.

Planning a passage may require the setting of Safety Depth or Safety Contour values that are not the same as those set to the active route being used. Changing these settings when connected to the active route will clearly affect monitoring and it is therefore unsafe to do so.

DNV Rules include the requirement for

"route planning facilities to be provided to enable the navigator to plan the route for the intended voyage without interfering with the ship's navigation. The workstation used for these tasks is to be equipped with means for efficient route planning and the direct transfer of the planned route to the navigation workstation(s)."

A Navigator therefore must have all available means to assist with passage planning and this includes ECDIS. Bridge watchkeeping officers should also not be denied the use of such a useful navigation system. However, sensible measures are required during watch hours to ensure that ECDIS does not intervene with a safe and effective navigational watch.

POTENTIAL ERRORS IN THE USE OF ECDIS

One of the major problems preventing the extensive use of ECDIS is the absence of official ENC data encompassing major shipping routes and ports. The principal concerns of navigators using non-official digital chart data are matters of quality and the foundations of the data. Information portrayed on ECDIS, including corrections and updates, is dependent on acquiring advanced technical hydrographic data. Some Hydrographic Offices (HOs) in certain parts of the world have problems with this. Assembling ENC data in compliance with IHO performance standards is highly technical and very much down to having the resources, professional expertise and procedural support. To provide a continuous source of advanced technical hydrographic data for ECDIS would require some nations to invest in additional high-tech equipment and professional staff. Furthermore these Hydrographic Offices themselves have expressed concern about the slow development of structures to distribute and update their ENC data.

A further concern is that some countries are not willing to share their ENC data with the maritime world. Many countries have insufficient means to confirm the accuracy and to ensure the quality of the existing data available to them. Inevitably the difficulty in providing official ENC data by Hydrographic Offices worldwide to the IHO is overall due to lack of funding and the absence of professionals for data production and authentication ●



Capt Brian Thomas MNI

Master Mariner &
Independent Inspector

“ assuming that ECDIS is a vessel's primary means of position monitoring, using the same device for planning another route during a watch could lead to certain disaster ”

ECDIS

A RISK MANAGER'S PERSPECTIVE

We are now seeing the mandatory introduction of ECDIS being rolled out throughout the world's merchant fleets. Is the industry really prepared and has each company carried out a full appreciation of the risks involved?

There will be some ship operators that have carried out extensive preparation, risk analysis and training and have fitted the equipment on board, some that are along the road of implementation and others (probably in the majority) that have not yet started the process.

There is no doubt in my mind that the implementation of ECDIS is the most significant change in navigation practice ever to have taken place since the introduction of radar. We have all seen new electronic aids to navigation being introduced over the years, assisting the navigating officer and making the passage of ships (at least in theory) safer, but the majority of that equipment has been relatively straightforward to use and has required a minimal amount of training and familiarisation to operate successfully. The fitting and use of ECDIS requires a lot more thought and planning and a strategy is needed that takes into consideration the associated risks and not just the benefits.

There are, of course, many benefits and equipment suppliers will wax lyrical about the cost savings, the ease of corrections (hence freeing up time on board), improved visual awareness, more efficient passage planning, enhanced safety of navigation etc etc. But what about the potential problems?

Firstly there is the variety of types of ECDIS units available and being supplied to ships. An officer may have been trained and/or sailed with a specific manufacturer's model only to find himself with another type on his next tour of duty. While the symbols and general display will be the same, the controls may be significantly different and take some time to become familiar with. If he isn't given suitable time for handover/familiarisation with this equipment on board then the consequences could be serious.

Meanwhile there may be a relatively large number of manufacturers producing ECDIS units, but if a company hasn't already taken steps to purchase the equipment, it may find itself struggling to implement the system on time as demand is increasingly high. A significant number of companies may have held back over the past few years due to an element of "let's wait and see" and a degree of confusion over what systems are approved or otherwise.

Training itself may have been held back due to companies being reluctant to send their employees on a course if its ships have still not been fitted out. There is an increasing number of training establishments around the world offering ECDIS training, but any good company should do its research into the subject and this shouldn't be restricted to a few hits on the internet!

Flag State requirements may vary relating to approval, availability of back-up systems and training, and companies must be certain that these requirements are being followed (a potentially large minefield in a large multi-flag fleet).

Another concern is whether the company's navigational procedures, including checklists, contained in the Safety Management System are still valid and whether they take into consideration suitable industry guidance for the use of ECDIS.

The above are just a few areas that can be cause for concern. The only way to properly address these (and more) is to firstly carry out a generic risk assessment for the fleet. This may take some time and would be an ongoing strategy as time progresses, equipment is sourced and training is conducted. Once ECDIS systems are fitted on board, then ideally individual risk assessments should be carried out for each ship, involving the Master and ship's deck officers; after all it is these men who will be using the equipment.

It can be seen that the entire implementation strategy can be a complex one and one that should be given serious consideration. Adequate resources should be given to the project, perhaps considering the use of an external project manager to manage the strategy correctly.

While there is a responsibility of those on board each ship to use the equipment correctly, every company should take responsibility to ensure that their staff remain competent with ECDIS. Companies should carry out periodical navigational audits to ensure compliance, taking steps to rectify any non-conformities that may result.

Finally, it should be remembered that the fundamental principles of chartwork still exist and are still taught. Users of ECDIS should embrace these principles along with other navigational skills and not be tempted to get captured in an almost virtual electronic world of wizardry (perhaps the greatest risk of all). ECDIS is an extremely important tool that, if used correctly, will help the navigator sail his ship safely •



David McFarlane

Master Mariner MNI MRIN

**Director, Maritime Risk and
Safety Consultants Ltd**

“ the implementation of ECDIS is the most significant change in navigation practice ever to have taken place since the introduction of radar ”

ECDIS MATTERS

ECDIS already has a big impact on the marine industry. It has changed some of the age old navigational practices. SOLAS makes the carriage of ECDIS mandatory on certain ship types by 01 July 2012. However the mandatory training course for ECDIS does not seem enough; it will be useful for the shipping companies to provide model specific training to their staff. It may also be useful if the companies installed same make and model of ECDIS on all ships in their fleet, especially in cases of retrofitting or new builds.

Most navigators - including myself - are comfortable with it. It is also taken on well by the younger generation of navigators. Master and OOW may view the system with different perspective; the OOW's are quick to learn the system and the senior Masters focus more on legal and management issues and at times are known to be slow in its practical use. The younger generation of navigators needs to focus on familiarization with different position fixing systems; and procedures related to cross checking positions using different means.

The biggest concern with ECDIS is over reliance by the mariner; the system will be based on the charts available for use and the position input system. Some poorly trained mariners have known to be plotting range and bearing read off from the ECDIS. Back-up provisions are satisfactory in

general, but in cases of longer power breakdown the 6 hour UPS may not be enough.

Certain models were known to have difficulty in shifting the position from main chart to the Inset of harbour or port area when operating in the Raster Mode; in some cases systems have known to freeze at such stages of the passage. In some cases, mariners struggle to use PI's effectively when working with ECDIS simultaneously.

The greatest benefit is the display of real time continuous dynamic position of the vessel; along with ability to provide historic position information. The passage planning becomes much easier and the provision of alarms warns mariners of dangers being approached. However, the quality of the ENC plays a significant role in providing the warnings/alarms, as ECDIS does it based on contours. ENC's with insufficient contours may fail to generate timely warning. The laborious task of chart corrections seems history now. In coastal waters, the radar overlay allows rapid cross-check of the ECDIS. High precision and reliable systems like Galileo and E-LORAN will allow further confidence in the system.

Operated correctly and in compliance with SOLAS requirements; it is a wonderful tool to improve safety of navigation and reduce the workload of the bridge team ●



Capt Nadeem Anwar

Managing Director

**Flag Marine Advisory,
Bahrain**

“ the greatest benefit is the display of real time continuous dynamic position of the vessel ”

ECDIS

ON MALACCA/SINGAPORE STRAITS

With the advancement of technology, development of ECDIS had gone quite a long way forward. ECDIS technology now allows the precise monitoring of the vessel on a passage plan and uses path prediction techniques to provide a forecast for safe navigation.

The impact of these technological advances may perhaps be most critical on the shipmaster and in a secondary manner on the bridge team. ECDIS systems are now largely becoming the primary means of position fixing, monitoring and tracking traffic movements for the vessel.

Due to the nature and sophistication of this modern equipment and its simplicity to operate, there appears to be a developing trend of bridge team members placing almost complete reliance on the ECDIS system during navigation while ignoring the more traditional and time-tested techniques of safe navigation like manual fixes, parallel indexing, using leading line and clearing transits.

By way of anecdotal evidence, it is not uncommon for me to see the younger generation of deck officers glued to the ECDIS when I pilot their vessels. If left unchecked, complacency would quickly set in leading to these officers treating position fixing simply as numbers read off the GPS and plotted on the chart while collision avoidance manoeuvres are monitored and assessed purely from ECDIS data and nothing else.

ECDIS, whilst a marvellous navigational aid, cannot and must not be taken as an excuse by watch officers to abandon other important and fundamental good navigation and seamanship techniques. Buoys, beacons, racons and stately lighthouses pass by without these modern-day navigators even lifting their eyes to look out of the window. It is sad these days to see the compass repeaters at the bridge wings often nicely wrapped up and lashed in canvas. Whilst it is unavoidable that some old navigational equipment (like the sextant) would be rendered less important with the advent of new technology like the GPS, it should not be used as a reason to abandon wholesale the good seamanship practices of the past.

If this trend of overreliance on technology is allowed to grow unchecked, we may end up having a situation where shipowners may be tempted to suggest that the ECDIS system alone is more than sufficient to assist the Master to navigate critical waterways like the Malacca Strait without the benefit of Pilot assistance.

Whilst advancement in technology is always welcomed, particularly in cases where the safety of navigation is enhanced, one has to be mindful of the limitations that come with it. This sophisticated navigational equipment may assist and enhance the level of performance of the navigator by making available to him a host of important information at the touch of a button, but it can also, if not guarded against, create a false sense of adequacy, comfort and security for the navigator. As always, a piece of equipment is only as good as the person operating it. Unless the person handling the equipment is properly trained and is provided with a good and safe working environment, accidents are bound to occur regardless of how sophisticated or advanced the equipment

installed on board. Factors that have an important influence on safe navigation and which have been proven on many occasions to contribute to a mishap include:

- (a) Lack of a safe working system. This may lead to the inability of the navigator to focus on the job due to fatigue/tiredness/stress.
- (b) Lack of familiarity with shiphandling in confined waters. No amount of sophisticated equipment can replace a mariner's experience in shiphandling. Shipowners must invest in both time and expense to ensure sufficient training is given to their personnel to pick up such skills. As a minimum, shipowners must be alive to the fact that special skills are needed to navigate a vessel through confined waters and they should not underestimate the importance of engaging the services of an experienced pilot in such circumstances. The tremendous benefit owners derive from ensuring the safety of their vessel (not to mention that of the environment and of other vessels in the vicinity) by engaging an experienced pilot far outweighs the slight additional costs involved.
- (c) Inadequate or poor training on BRM and shipboard equipment. Due to the diversity of ECDIS equipment available on the market, proper training is required for safe and correct operation.
- (d) Human factor. The interpretation of data is critical to the safe operation of ECDIS. A human operator's mental perception of the traffic and situation on ECDIS will influence his decision in manoeuvring. The consequences could be serious if he were to make an incorrect judgement. In that regard, it is not good seamanship practice for a navigator to base all his decisions on collision avoidance solely on the information given by ECDIS. He must not abandon the age-old and time-tested method of keeping a good lookout by visually checking the vessels and landmarks in the vicinity, closely monitoring the change (if any) of the navigational lights of approaching vessels etc.
- (e) Lack of hardware and user interface. Shipowners should measure the equipment against the quality of people they have on board. They should consider whether the equipment installed is too complex or sophisticated for the bridge team to handle, assess whether the user manual is simple enough for the operators to understand, and identify whether additional training is required to operate the equipment.
- (f) Unreliable/defective shipboard equipment. Prime sensors are usually AIS linked and faulty data could contribute to ECDIS assisted incidents. Incorrect settings may have been unknowingly input into the system by untrained personnel.
- (g) Inability to effectively communicate with traffic and/or VTS stations (eg inadequate command of a common language).

- (h) Uncertain contingency plan for emergency. Due to unfamiliarity with the route and lack of local knowledge, the bridge team may not be able to draw up an effective contingency plan for the passage.

Although technology has always provided the marine industry with various new equipment to improve the safety and quality of navigation, including but not limited to the precise positioning capabilities of vessels and the ability to monitor surrounding traffic with greater efficiency, wholesale abandonment of pilotage systems should not be advocated. Both (ie pilotage services and the latest navigational aids on board) would have to complement rather than replace the other.

Given the current state of the industry and the foreseeable technological advances in the near future, there will always be a need for pilotage services in certain waterways around the world. That said, there is no doubt that ECDIS is an extremely valuable tool in the hands of a navigator or pilot. For one, ECDIS relieves the navigator of the task of having to manually fix the vessel's position at regular intervals during a passage. This would allow him to focus his attention on the more critical aspects of navigation like the assessment of risk of collision and collision avoidance action. Needless to say, the other bridge team members should maintain regular position fixing on the paper chart as a cross check to this modern marvel.

The unique circumstances involved in navigating the Malacca/Singapore Straits require the prudent shipowner to engage the services of a pilot to ensure the safety of both his vessel and the environment. Hazards include restricted navigational routes, numerous shallow patches, sharp angles and bends in certain parts of the Straits, limited radii of turns, the presence of many fishing vessels, and unpredictable and fairly strong currents in certain areas of the Straits. In the same vein, ECDIS would be a valuable tool for both pilot and watchkeeper in the safe navigation of the vessel given its ability to provide continuous traffic surveillance and accurate position fixing.

This is particularly important for the pilot/shiphandler as he manoeuvres the vessel in restricted waters or when steaming through areas of restricted visibility (eg due to heavy rain, fog

or haze). With ECDIS, the position of the vessel relative to its surroundings and to immediate danger is constantly on screen enabling the pilot/shiphandler to make assessments and take corrective measures with confidence.

The Malacca/Singapore traffic management systems, VTS Malaysia and VTIS Singapore, while serving the Straits community well has a shortcoming due to the density and complexity of the traffic within the TSS. Reading target data and using path prediction techniques on their ECDIS, VTS operators fulfil their advisory function by calling upon ships to advise caution or to make corrective actions for safe navigation. The vessels will then be required to make their own decision for the appropriate action. Although these services do enhance the overall safety of navigation in the areas they are provided, one has to be mindful of their limitations. For example, there is always a possibility of the wrong vessel being identified due to a target swap. Sometimes the quality of the data available on ECDIS can be adversely affected by vessel track integrity and target degradation.

One way the littoral States like Malaysia, Singapore and Indonesia can try to safeguard their interest on environmental protection, safety of navigation and Malacca/Singapore Straits vessel traffic management is to expedite whatever joint arrangements/cooperation efforts they may have put in place over the years.

Measures must quickly be taken in order to significantly improve the regulation of 'sensitive' vessels navigating in the Malacca/Singapore Straits. Although there is IMO's recommendation for deep-draughted vessels and VLCCs to use pilotage services when transiting the Malacca/Singapore Straits, not all companies managing laden vessels and VLCCs observe the IMO recommendation.

While shore-based VTS along the Malaysia and Singapore coastlines provides advisory services when requested and while AIS/ECDIS provides positioning and tracking capabilities on the vessel, a shipboard advisor (pilot) is still the positive way to enhance the safety of navigation in the critical waterway ●



Capt Fadzlon Ahmad

Managing Director & Chief
Marine Advisor

StrasseLink Pte Ltd

“ there appears to be a developing trend of bridge team members placing almost complete reliance on the ECDIS ”

THE REVOLUTION ON THE BRIDGE

MADE BY ECDIS

I have been at sea since 1994 and working with ECDIS since 2002 on cargo ships and passenger ships.

ECDIS has developed significantly in recent years and made a huge impact on the shipping industry. Many large, modern shipping companies have fully ECDIS fitted ships and no paper charts. Other companies use paper charts as the primary means for navigation with ECDIS fitted as a back-up, and of course some companies have no ECDIS and rely on paper charts only.

The change from paper to digital creates a gap between the new generation navigators and the old fashioned Masters, Chief Officers and OOWs. This change also creates a gap between companies. For example some cruise companies are far ahead in the training of their officers compared with some cargo companies. The depth of knowledge of deck officers in the cruise industry is usually considerably more than deck officers on cargo ships. This is because cruise companies are more willing to send their officers on regular training courses and budget accordingly.

COMFORT WITH THE SYSTEM

Many of us feel very comfortable with ECDIS. New generation navigators will have attended ECDIS/NACOS courses and have sufficient depth of knowledge and a couple of years' experience with the new systems. They have practised different scenarios on a simulator to "learn the lessons" of using ECDIS. They know how reliable the system is and its limitations. However, I have seen many deck officers feeling overconfident with ECDIS. Some of them have seen ECDIS only in naval academies or nautical colleges and have never worked on board with it.

Other officers do not feel comfortable at all with ECDIS and prefer to use paper charts, triangles, parallel ruler and divider. Some of the older officers have very limited IT skills and rely on their juniors, particularly when ECDIS has to be updated or modified, or even to get important information on arrivals and departures. This can lead to dangerous navigation and poor bridge team management. Officers may have no familiarity or confidence with ECDIS, but find their head office is pushing for it to be used and paper charts reduced to a minimum.

TRAINING

Every Master and deck officer should attend an ECDIS course lasting a minimum of one week. Students should have sufficient time to examine theory questions and case studies and to practise on an ECDIS simulator with an experienced professional. The different types of ECDIS and electronic charts should be examined, highlighting their negatives and positives. Priority should be given to using parallel indexing in

coastal navigation, as well as to position fixing by bearing and ranges on an electronic chart taken from the radar or visually. Courses should be under one standard in every country around the world, issued and controlled by the IMO.

SYSTEM BENEFITS

ECDIS has brought many benefits to navigation:

1. It is easy to create the voyage plan and to correct (optimise) it. The ship's position is updated very accurately every few seconds on an electronic chart depending on the GPS or DGPS settings. As the OOW does not need to plot the ship's position on the chart so often, he can concentrate much more on the traffic situation and can see in real time the position of other vessels.
2. We can use trial manoeuvre to access the traffic situation on the ARPA and if the ECDIS and the ARPA are combined this will give us a much better picture of the traffic situation.
3. We can record the past track and review it if we want to see how the ship was manoeuvred.
4. We can easily set depth alarms and shallow waters on the vector charts and avoid dangers for navigation.
5. We can update the ECDIS on line instead of waiting for paper copies of Notices to Mariners to arrive in some "convenient" port brought by the ship's agent.
6. It reduces the amount of time and work spent updating paper charts.
7. It reduces significantly the cost of ordering paper charts and keeping them up to date. We can order ENC's only for certain areas for a certain period of time.
8. We can easily adjust the ETA and estimate the distances and the speed required between points. Speed limits can be included in the voyage plan.
9. We can obtain information from ECDIS much quicker than searching in pilot books.
10. We can easily optimise the routes and choose between the Rhumb Line and Great Circle.
11. We can optimise our track depending on the weather reports (currents, wind condition and sea state) received from the shore-based station. This allows another navigation system called NAPA POWER, compatible with ECDIS, to estimate the fuel consumption on that particular ship on a couple of different tracks from point A to point B. The system transfers the most economical and efficient track onto the ECDIS. Considering fuel efficiency and oil prices, this is a huge benefit for navigation for every company. I believe there is a lot more to be improved in this area.

SYSTEM CONCERNS

The variety of systems is a major concern. We have different ships from different companies with very different brands and types of equipment. This can make the life of the bridge team very difficult. All of us know the handover is usually short, particularly on cargo vessels, sometimes just 15 minutes on the gangway. It takes time to familiarise yourself and if more than one deck officer on the bridge is in the same situation, the Master should be concerned about the safety of his vessel. This is commercial pressure and unfortunately exists everywhere.

I believe improvements are required regarding back-up. Knowing which equipment is attached to the emergency diesel generator is a big mystery on many ships I have been on. What is on paper may be completely different in reality. This should be a standard check for every ship.

Everyone who has worked with ECDIS knows what happens when there is a corrupted file when updating electronic charts. The system gets confused and it is difficult to understand and detect exactly what is wrong. Considering this is a fully integrated bridge system, we can have very limited time before departure to fix the problem. The system can also reboot by itself, and this could happen in a critical situation like arrival or departure. You could be stuck without any notification, warning message or alarm. ECDIS should be rebooted on regular basis, usually once a week and only in port. ECDIS can also be affected by viruses.

During coastal navigation, I experienced a situation where the ECDIS was showing the same position for an hour despite the fact that the ship was sailing at 25 knots. It was a fully integrated bridge on a container ship, and the worst was that both ARPAs on X and S band were frozen too and showing target data with no indication that the system needed to be rebooted.

The system should not be relied on exclusively and an alternative method of position fixing should always be available, particularly in coastal waters. Parallel indexing should be used at all times. The ECDIS looks very good, but in reality the ship's position can be very inaccurate. If the GPS or DGPS loses signal and the OOW does not detect this, the ECDIS can easily go into DR mode and the ship will end up on the rocks.

The GPS is controlled by the US Ministry of Defense. Usually when they have military exercises, we can expect to lose signal or to have inaccurate data.

Nowadays anyone can buy and come on board with a GPS jammer, a low-cost device to temporarily disable the reception of the civilian course acquisition (C/A) code used for the standard positioning service (SPS) on the Global Positioning System (GPS/NAVSTAR). The GPS signal can be lost in high latitudes and the charts there are not accurate. TV antennas and the sun can also affect the GPS signal. Again, the ECDIS goes into DR, compromising the safety of the ship.

If ARPA and ECDIS are combined, the OOW should know the limits of the system. If he uses the ARPA in ECDIS mode, that means to overlay the electronic chart on the radar picture and vice versa, depending on the system setting he can get up to 30/40% of the radar picture. This means he can easily miss some small targets. Too much information on the radar screen overlaid with C-MAP or ENC can overload and distract the OOW and he can easily miss a dangerous target.

Many officers do not know the difference between Electronic Navigational Charts (ENCs), C-MAP charts, electronic charts and Admiralty Raster Charts (ARCs). They just pick the best image on the ECDIS, whether or not it is approved for navigation. My personal opinion is that the majority of older Masters need more time and training to know the limits of ECDIS ●



Asen Gyurov

1st Officer

Norwegian Cruse Line

“ the system can also reboot by itself, and this could happen in a critical situation like arrival or departure ”

CHOOSING ECDIS SYSTEMS

ECDIS IS TO BE PHASED IN BETWEEN 2012 AND 2018 AS FOLLOWS:

NEW BUILD SHIPS

These are the requirements to fit ECDIS on new build ships (that will be engaged on international voyages) based on their construction date (on or after):

- ◉ 1 July 2012 for passenger ships ≥ 500 gt
- ◉ 1 July 2012 for tankers $\geq 3,000$ gt
- ◉ 1 July 2013 for cargo ships, other than tankers $\geq 10,000$ gt
- ◉ 1 July 2014 for cargo ships, other than tankers $\geq 3,000$ gt but $< 10,000$ gt.

IMPLEMENTATION DATE

FOR SHIPS CONSTRUCTED BEFORE THE FOLLOWING DATES:

- ◉ 1 July 2012 for passenger ships ≥ 500 gt, not later than the first survey on or after 1 July 2014
- ◉ 1 July 2012 for tankers $\geq 3,000$ gt, not later than the first survey on or after 1 July 2015
- ◉ 1 July 2013 for cargo ships, other than tankers, $\geq 50,000$ gt, not later than the first survey on or after 1 July 2016
- ◉ 1 July 2013 for cargo ships, other than tankers, $\geq 20,000$ gt but $< 50,000$ gt, not later than the first survey on or after 1 July 2017
- ◉ 1 July 2013 for cargo ships, other than tankers, $\geq 10,000$ gt but $< 20,000$ gt, not later than the first survey on or after 1 July 2018.

This is going to result in substantial capital expenditure for shipping companies and requires a major decision as to which system a ship's navigation will be planned, executed and monitored on. Many superintendents may favour a specific system because they liked the radar and ARPA equipment that originated from that company, or they know of manufacturers that produce exceptionally reliable equipment, or they have been bowled over by a company's service team or, conversely, know which companies to keep well away from. This article should provide some assistance in profiling the market.


1. Consilium Marine – Consilium Selesmar ECDIS

Name of System: Selesmar ECDIS Manufacturer & Country: Consilium Marine US Inc. http://www.consilium.se Standard: Consilium Selesmar ECDIS is fully compliant with the IMO Resolution A.817(19):1995, IMO Resolution MSC.64(67), Annex 5:1996, IHO S-57 and S-52 Standards, IEC 61174:1998 and IMO A.817(19) Appendix A.7:1998.	
Overview of System:	Consilium Selesmar ECDIS has been developed based on extensive experience of a world-class innovative engineering team with several 'firsts' in maritime electronics within radar data processing, radar data extraction, display presentation and electronic cartography.
Features:	<ul style="list-style-type: none"> • Single integrated display, chart, radar, ARPA and AIS, designed in accordance with IMO/IEC requirements for Integrated Navigation Systems • Can accept UKHO ENC's along with raster charts produced by other HOs • Enables extremely precise navigation providing precise bearings at range • Operates all major chart formats, seamless display of ARCS ENC charts • Simple, low cost update and maintenance of charts via email • Selection of hardware options • High mean time between failure and low mean time to repair • Can be run on Consilium Voyage Data Recorders (S-VDR and VDR)
Contact:	http://www.consilium.se/contacts





2. Danelec ECDIS DM-800E

Name of System:	ECDIS DM-800E
Manufacturer & Country:	Danelec Marine A/S, Blokken 44, DK-3460 Birkerød, Denmark www.danelec-marine.com
Standard:	Wheelmark Type Approval DNV, and complies with the requirements enacted by the IMO regarding the installation of ECDIS on existing ships.

Overview of System:	<p>The ECDIS DM-800E makes navigation easy and significantly improves safety at sea. The system offers precise information about the position of the ship, and includes intuitive route planning functions, ensuring optimal navigation routes, which in turn leads to reduced fuel consumption.</p> <p>Furthermore, the sea charts can easily be updated via the C-MAP Update Service, which minimises time-consuming and costly efforts that are associated with the necessary and mandatory updating of sea charts.</p> <p>ECDIS DM-800E has been developed specifically for retrofit installations, and has apart from the well-known advantages of ECDIS, a number of other advantages and services.</p>	
Features:	<ul style="list-style-type: none"> • Easy, simple and cost effective installation • Service friendly • Precise real time positioning and route monitoring • Advanced route planning function • Radar overlay • Integrated weather forecast information • Alarm functions • Chart corrections • Fuel saving • Intuitive menu structure for easy operation with built-in user manual and on-line help • Weather data • Recording and playback of voyage data recording 	
Contact:	Email: sales@danelec-marine.com	

3. FURUNO ECDIS SYSTEM FEA-2107, FEA-2807

Name of System:	FURUNO ECDIS SYSTEM FEA-2107, FEA-2807
Manufacturer & Country:	FURUNO ELECTRIC CO LTD, Headquarters-Nishinomiya City, Hyogo 662-8580, Japan (bases in over 40 countries around the world)
Standard:	IMO MSC.232(82), IEC 61174 ed3


Overview of System:	<p>Display Unit FEA-2107: MU-201CE, 20.1" color LCD, SXGA (1280 x 1024 pixels) FEA-2807: MU-231CE, 23.1" color LCD, UXGA (1600 x 1200 pixels)</p> <p>Operating System - Windows XP</p> <p>Useable Charts - IHO/S-57 v.3 vector chart, ARCS raster chart, C-MAP CM93 ed3, C-MAP CM-ENC</p> <p>Presentation Modes - True/Relative Motion North-up, True/Relative Motion Course-up, Relative Motion Route-up</p> <p>Display of data Own ship: Position, SOG, COG, Heading Route: Planned route, Monitoring route ARPA targets: Range, Bearing, Speed, Course, CPA and TCPA Others: EBL, VRM, Parallel index line, Cursor position, Navigation and pilot data notebook</p> <p>Route/Waypoint Route: more than 100 routes Waypoints: 200 waypoints/route</p> <p>Voyage Calculation – The following data can be calculated: Range/Bearing to destination, TTG, ETA, Fuel consumption</p> <p>Route Navigation Monitoring – Off track, Waypoint, Arrival, Grounding, Depth</p> <p>Alarms – Off track, Channel limit, Waypoint approach, Depth</p> <p>Other Functions Night/day presentation colors, ARPA target display, Radar overlay, User chart function, Position optimization, MOB, Log book, Pilot data function, Track control system (TCS)</p>	 <p>FEA-2107</p>  <p>FEA-2807</p>
Features:	<ul style="list-style-type: none"> • Radar/Navigation Data Overlay • Wide Network/Interface Option Delivers Flexible System Construction • Track Control System • Comprehensive Route Planning • Stress-free Operation through Ergonomically-designed Control Unit 	
Contact:	deepsea@furuno.co.jp	

4. GEM Elettronica ECDIS ECD-600

Name of System: **ECDIS ECD-600 (Box Unit Version)**

Manufacturer & Country: GEM Elettronica, via A Vespucci 9, PO Box 280 63039 San Benedetto del Tronto (AP), Italy, www.gemrad.com

Standard: Approved by DNV, having been tested according to the latest specifications of IMO, IHO and IEC


Overview of System:	<ul style="list-style-type: none"> • Safe Navigation • Precision and Speed in mathematic calculations • Wide availability of world charts • Standard windows man-machine interface • Integration of Software, Hardware and mechanical knowledge <p>Basic configuration including monitor, keyboard, computer unit with basic interfaces, installation kit, user manual</p> <p>Options:</p> <ul style="list-style-type: none"> • mechanical enclosure for floor mounting • serial multiplexer • monitor enclosure for table-top mounting • keyboard enclosure for table-top mounting • UPS 	
Features:	<ul style="list-style-type: none"> • Fully type approved by DNV according to IEC 61174 • Route planning • Route monitoring • Logbook with playback facility • Manual update of charts • ARPA and AIS target display and information • North up, Head up and Course up modes • Relative and True motion display <p>Additional Features</p> <ul style="list-style-type: none"> • Five colour palettes are provided to satisfy every bridge lighting condition 	<ul style="list-style-type: none"> • Information on demand about targets, chart objects, mariner's objects, etc • Mariner's objects insertion and definition • Echosounder information • Tides information • Estimated position by triangulation with two or more points • Prediction of future ownship position • Estimated time to reach a waypoint • Distance abeam • Polygonal and sector danger zones • Disanchorage and bearing point alarms
Contact:	http://www.gemrad.com/contacts.php	

5. GEM Elettronica – ECDIS ECD-700

Name of System: **ECDIS ECD-700 (Desktop Version)**

Manufacturer & Country: GEM Elettronica, via A Vespucci 9, PO Box 280 63039 San Benedetto del Tronto (AP), Italy, www.gemrad.com

Standard: Approved by DNV, having been tested according to the latest specifications of IMO, IHO and IEC

Overview of System:	<ul style="list-style-type: none"> • Safe Navigation • Precision and Speed in mathematic calculations • Wide availability of world charts • Standard windows man-machine interface • Integration of Software, Hardware and mechanical knowledge <p>Full optional ECDIS including table-top unit, RUGB-70-26 unit with basic and optional interfaces, UPS, installation kit, user manual</p> <p>Options:</p> <ul style="list-style-type: none"> • pedestal for console mounting • interface unit for military or special applications 	
Features:	<ul style="list-style-type: none"> • Fully type approved by DNV according to IEC 61174 • Route planning • Route monitoring • Logbook with playback facility • Manual update of charts • ARPA and AIS target display and information • North up, Head up and Course up modes • Relative and True motion display <p>Additional Features</p> <ul style="list-style-type: none"> • Five colour palettes are provided to satisfy every bridge lighting condition • Information on demand about targets, chart objects, mariner's objects • Mariner's objects insertion and definition • Echosounder information • Tides information • Estimated position by triangulation with two or more points • Prediction of future ownship position • Estimated time to reach a waypoint • Distance abeam • Polygonal and sector danger zones • Disanchorage and bearing point alarms 	
Contact:	http://www.gemrad.com/contacts.php	

6. JRC – JAN-701B/901B ECDIS

Name of System: **JAN-701B ECDIS**
 Manufacturer & Country: JRC, Japan Radio Co Ltd Fujisawa bldg. 30-16, Ogikubo 4-chome Suginami-ku, Tokyo 167-8540, Japan, <http://www.jrc.co.jp/jp/index.html>
 Standard: Complies with new SOLAS regulations MSC 232(82) performance standard for ECDIS, effective from 1 January 2009.

Overview of System:	<p>The JAN-701B/901B is a newly developed multi-functional ECDIS. It is ergonomically designed to enhance the working environment and man/machine interfaces.</p> <ul style="list-style-type: none"> • 19" or 23" high visibility LCD screen • Simultaneous real-time radar and AIS overlay • Advanced route planning • Multiple and wide screen viewing • High-speed graphic processor
Features:	<p>RADAR Overlay, AIS targets, Multi-view, Flexible black box configuration, User interface, Conning and external sensors, Consistent Common Reference Point (CCRP), integrates a single-press Man OverBoard (MOB) operation, Optimised viewing, Advanced route planning, Editing the user maps, Track and time label.</p> <p>The new keyboard design of the JAN-901B allows you to carry out all operations simply by using the keyboard or on-screen by use of the trackball.</p>
Contact :	http://www.jrc.co.jp/eng/product/contact.html



JAN-701B (19" LCD)

JAN-901B (23" LCD)



JRC has issued an urgent warning and software update that affects some early ECDIS Models. See page 1 & 17.

7. JRC – JAN-2000 ECDIS

Name of System: **JAN-2000 ECDIS**
 Manufacturer & Country: JRC, Japan Radio Co Ltd Fujisawa bldg. 30-16, Ogikubo 4-chome Suginami-ku, Tokyo 167-8540, Japan, <http://www.jrc.co.jp/jp/index.html>
 Standard: Complies with new SOLAS regulations MSC 232(82) performance standard for ECDIS, effective from 1 January 2009.

Overview of System:	<p>The new JAN-2000 is a high-performance and fully type approved ECDIS system with excellent on-screen menus, which will greatly shorten most users' learning period.</p> <ul style="list-style-type: none"> • 18.1 or 19-inch high visibility displays • Simultaneous display vector and raster charts • Multiple and wide screen viewing • Flexible black box configuration • Cost effective installation
Features:	<ul style="list-style-type: none"> • Cost-effective solution • AIS targets • Multi-view • Grounding avoidance • Backed up via LAN • Optimised viewing • Flexible black box configuration • Interfaces • Advanced route planning • Man Overboard operation
Contact:	http://www.jrc.co.jp/eng/product/contact.html



JRC has issued an urgent warning and software update that affects some early ECDIS Models. See page 1 & 17.

8. Kelvin Hughes – Manta Digital ECDIS

Name of System: **MantaDigital**
 Manufacturer & Country: Kelvin Hughes Limited UK (Head Office):
 New North Road, Hainault, Ilford, Essex IG6 2UR T: +44 20 8500 1020 F: +44 20 8500 0837
http://kelvinhughes.info/index.php?option=com_frontpage&Itemid=1
 Standard: Display variants are approved to IEC 61174 Type approved autopilot track control IEC 62065

Overview of System:	<p>Manta ECDIS follows in the same trackball and 3 button mode as the Nucleus range of Radar and Chart systems.</p> <p>Available in 1700, 2000 and 2300 display sizes, to fit the Kelvin Hughes integrated bridges, though can also be used as a stand-alone unit.</p>
Features:	<ul style="list-style-type: none"> • Flat Panel, TFT display • Route planning and monitoring • Autopilot control • ARPA target display • Safety contour, Depth • Radar Interlay Display • User mapping • Display of chart updates • Update logging • Onscreen Radar, incl. 'course up' and 'relative motion' display • Alternative route display • Safety checking and warning • Complete voyage recording including past track
Contact:	marketing@kelvinhughes.co.uk



9. K-Bridge Electronic ECDIS Electronic Chart Display System

Name of System: **K-Bridge Electronic Chart Display and Information System**

Manufacturer & Country: Kongsberg Maritime AS, Kirkegårdsveien 45, PO Box 483, NO-3601 Kongsberg, Norway, www.km.kongsberg.com

Standard:

- **IEC 61174 Ed.2.0** ECDIS Operational and Performance Requirements. Method of Testing and Required Test Results
- **IMO Resolution A.817 (19)**, Performance Standard for Electronic Chart Display and Information Systems
- **IEC 60945 Ed.3.0** Marine Navigational equipment, General Requirements. Methods of Testing and Required Test Results
- **NMEA 0183 version 2.30** Standard for interfacing Marine Electronic Devices
- **IEC 61162 Ed.2.0** Maritime navigation and radio communication equipment and systems – Digital interfaces
- **IEC 529 Second edition (1989-11)**, Degrees of protection provided by enclosures (IP code)
- **AIS interface** is compatible with ITU-R M.1371 and IEC 61993-2

Overview of System:

K-Bridge ECDIS system is a navigation information system that displays selected information from the electronic navigational charts with positional information from navigation sensors. The system is designed to assist the mariner in route planning and route monitoring, and by displaying additional navigation-related information.

ECDIS chart formats

- C-Map CM 93 edition 2 and edition 3
- C-Map ENC
- S-57 edition 3
- S-63 including Primar and IC-ENC (encrypted S-57 charts)
- DNC (Digital Nautical Charts) available as an option

ECDIS display

- 19" TFT display: 1280×1024 / 23" TFT display: 1600×1200

Features:

- Radar video overlay from K-Bridge ARPA radar
- Autopilot control
- Docking function provides prediction of ship movement
- Full route planning and validation functions
- Continuous monitoring of own ship in relation to route plan and waters
- Displays up to 100 ARPA tracked targets
- Displays targets and information from AIS
- Echo sounder monitoring and recording of chart depth information
- Navtex interface



Contact:

Kongsberg Maritime offices around the world:

<http://www.km.kongsberg.com/ks/web/nobkj0407.nsf/WebSubsidiaryWorldWide?ReadForm&count=-1>

Find local sales representative: <http://www.km.kongsberg.com/ks/web/nobkj0407.nsf/SalesContactLookup?OpenForm>

10. MARIS – ECDIS 900

Name of System: **MARIS ECDIS 900**

Manufacturer & Country: MARIS Danholmen 25, NO-3115 Tønsberg, Norway

Tel: +47 97 47 2000, Fax: +47 94 76 0911 E-mail: sales@maris.no

Standard: Designed in accordance with IMO/IEC requirements for Integrated Navigation Systems, fully compliant with IMO Resolution A.817.(19): 1995, IMO Resolution MSC.64 (67), Annex 5: 1996, IHO S-57 and S-52 standards, IEC 61174: 1998 and IMO A.817 (19) Appendix A.7:1998, Wheelmark (EU) approved

Overview of System:

The MARIS ECDIS 900 incorporates the latest in technology and by adding the MARIS PC Radar Kit, the ECDIS 900 can also be expanded to display radar video overlay.

Charts

- 'Multi fuelled' ENC (S57) and raster capability, including ARCS and BSB-NOAA
- Compatible with C-MAP worldwide database
- Integrated help for paper chart updating using ARCS service: the last updated tiles can be printed out in colour and actual scale

Route Planning

- Mix great circle and thumb-line legs, enter different turning radius values and select different XTE limits for each leg
- No need to plot the same waypoint several times: a new route can be created in one click from a selection of existing waypoints
- Check the route for dangers and highlight them on the chart
- Route simulation: passage calculator including ETA/TTG and required speed

Features:

- Chart Updates and corrections
- AIS
- Navigational data log and Play back
- Integrates NAVTEX Information
- Weather Forecasts
- Fairplay Ports and Terminal guides
- Tide and Current



Quote


MARIS ECDIS 900 is the first ECDIS in the world to receive a type approval certificate ('Wheelmark') using a Flat Panel Computer (FPC). The MARIS Smart-Line is the only FPC Certified to IEC 60945 for use onboard ships.

More than 500 ECDIS 900 systems have been delivered to end-users in more than 25 countries. This makes MARIS one of the top companies in the world delivering ECDIS and the fastest growing!


Contact:

http://www.maris.no/news_article35e4.html?news_articles.nid=31

11. MECys – ECDIS


Name of System: MECys ECDIS Manufacturer & Country: MECys, 921-10, Mandeok-3 Dong, Buk-Gu, Busan, Korea (Zip: 616-113) http://www.mecys.com/english/company.html Standard: IEC-61174		
Overview of System:	<p>MECys' ECDIS have been installed to the ROKNS KDX-I, II destroyer, 209 class submarine, LST.</p> <p>Basic Function</p> <ul style="list-style-type: none"> • Display S-57/ENC and the ship's location • Route Plan/Monitoring • Alarm • North/Head Up • Record navigation data and reply • Record radar image and target and reply • Display realtime 3D seabed model • ERBL (Electronic Range and Bearing Line) • Display ARPA Radar Target • Variety of datum support • Conning Display, Logbook <p>Additional Function (Option)</p> <ul style="list-style-type: none"> • Radar Overlay • AIS Target and Data Overlay <p>Connectivity</p> <ul style="list-style-type: none"> • GPS, DGPS, GLONASS, INS • Gyro Compass, Periscope • Speed Log • Radar, ARPA, Transponder, UAIS • Auto Pilot • Echo Sounder 	
Features:	<ul style="list-style-type: none"> • Fast display of S-57/ENC • Display national/international language • Human Interface • Flexible system according to user's need <ul style="list-style-type: none"> • Support IHO S-52 3.2 Present Library • Multi language support [Korean/English/Russian/Chinese] • Display tide information on the screen • Great Circle 	
Contact:	support@mecys.com	

12. Offshore Systems – ECPINS® 4000, 5000 Series

Name of System: ECPINS® 4000, 5000 Manufacturer & Country: Offshore Systems Ltd, #107-930 West 1st Street, North Vancouver, BC, Canada V7P 3N4 www.osigeospatial.com/offshoresystems Standard: Electronic Chart Precise Integrated Navigation System (ECPINS®) is an IMO Approved ECDIS		
Overview of System:	<p>ECPINS® 4000 is often referred as the "standard" model of the ECPINS® product line. It is a computerized, shipboard navigational aid that displays electronic charts, the own ship's position in real-time along with sensor data. It is an ECDIS equipped with rich features that facilitates precise navigation.</p> <p>It is available in a ruggedized modular or console system that can be easily integrated in to an existing Bridge. ECPINS® 4000 exceeds the standards for safe navigation. It is more than an ECDIS.</p> <ul style="list-style-type: none"> • Fully customized display • 3D Safety Zone and 'Ghost Ship' • Automatic position and heading source selection • Navigation activities include multiple EBL/VRM functionality, visual navigation tools, ship maneuvering and docking tools, rapid route production and hazard scanning feature • Bridge Monitoring capabilities include data layout, ambient condition adjustment, display customization, 3D safety zone, data query, electronic deck log and AIS and ARPA Display • Navigation planning includes planned intended movement, review and sign off, layout route, plan turns, scan for hazards and add visual support • AIS includes ECPINS® display of both static and voyage AIS data, AIS targets display scaled dimensions, minimum keyboard display (MKD) allows for complete AIS setup and control from ECPINS® console • Multi sensor integration and data from NMEA 018 compatible DGPS, gyro, speedlog, depth sounder, ARPA, anemometer and AIS sensors. Integrates with GPS differential beacon frequency control. • Extended NMEA GPS data support (satellite data, statistics, etc.) 	
Features:	<p>Intuitive Chart Display</p> <ul style="list-style-type: none"> • Supports all vector and raster chart formats ("multi fuel") • Multiple charts on screen integrate into a single "mosaic" display with no borders or seams – creating an unspoiled, complete chart • Multiple color selections for effective day and night use • Easy to view with automatic chart decluttering based on display scale <p>Enhanced Features</p> <ul style="list-style-type: none"> • Audio and visual alarms to alert users on potential groundings, collisions, cross track distance range being exceeded and/or the loss of sensor data 	<ul style="list-style-type: none"> • Advanced Voyage and Route Planning • Powerful playback functionality • AIS and ARPA Image Overlay Capability <p>Precise Situational Awareness</p> <ul style="list-style-type: none"> • View key ship information quickly and conveniently on the screen display • Allows quick reference check from the screen, allowing the user to remain focused on vessel safety and other bridge activities
Contact:	http://www.osigeospatial.com/offshoresystems/contact_us/locations.htm	

13. PC Maritime – Navmaster ECDIS 700

Name of System:	Navmaster ECDIS 700
Manufacturer & Country:	PC Maritime Ltd, Brunswick House, Brunswick Road, Plymouth, PL4 0NP, UK. www.pcmaritime.co.uk
Standard:	Intel Core2Duo certified to IEC60945 and IACS E10. TFT monitor certified to IEC60945, IEC61174 and IACS E10. Performance standard- MSC232 (82) Type approved by DNV

Overview of System:	<p>Navmaster ECDIS is an established Electronic Chart Display and Information System, incorporating the input of many navigators into its design over more than ten years.</p> <p>As their ECDIS is modular, it gives the customer flexibility as to where and how they install it from complete integrated bridge systems to compact retro-fit, where the monitor is dropped into the console and the processor fitted elsewhere.</p> <p>Key Benefits:</p> <ul style="list-style-type: none"> • Excellent route planning and detailed passage plan documentation • Remote Diagnostics feature for rapid and low-cost support • Up-to-date chart installation and updating processes • Option for radar video overlay • Modular design for easy installation in new builds and existing vessels – from VLCCs to workboats • ECDIS training modules with on-line assessment 	
Features:	<ul style="list-style-type: none"> • Real-time route monitoring • Berth-to-berth route planning • ARPA & AIS information and overlays • Interface with AIS • Voyage data recording and playback • Modular hardware • Aftercare and service 	
Contact:	email: commercial.sales@pcmairitime.co.uk	

14. Raytheon Anschütz – NSC ECDIS

Name of System:	NSC ECDIS
Manufacturer & Country:	Raytheon Anschütz GmbH, Zeyestrasse 16 – 24, D-24106 Kiel, Germany
Standard:	<ul style="list-style-type: none"> • Track control in conjunction with autopilot series NP2000 in accordance with the IEC 62065 • Recording and output of relevant voyage information in accordance with IMO performance standard


Overview of System:	<p>The Raytheon Anschütz NSC ECDIS offers effective support for the ship's safe navigation. Following common operator philosophy, it provides interfaces to many existing bridge systems and navigation devices. It can be configured for integration with ARPA radar, gyro compass, autopilot, AIS, echo sounder, speed log, wind speed direction sensor, position receivers and engine rpm sensors. Thus the ECDIS is able to display navigational sensor data and corresponding alarms.</p>	
Features:	<ul style="list-style-type: none"> • Automatic selection of navigational charts relative to position with both ENC and ARCS charts • Supports the following Chart formats: C-Map ENC (paper chart equivalence), C-Map Professional + S 57/S 63 Encrypted ENC, DNC, ARCS. • Display of radar information (tracked ARPA targets) • Radar image overlay (option) • Chart/route server: Sharing of charts, updates and routes in configurations with more than one ECDIS • Display of AIS targets (with vectors for heading and speed); additional target data are available by click • AIS-server function • Route planning and route monitoring • Automatic route planning function • Tidal prediction function • Online updating of charts • Online help available to support the operator at work • Available as table top, deckstand or blackbox version 	
Contact:	http://www.raytheon-anschuetz.com/index.php?StoryID=116	

15. SAM Electronics CHARTPILOT 1100

Name of System: **CHARTPILOT 1100 – The Universal Solution**

Manufacturer & Country: SAM Electronics GmbH, Behringstrasse 120, 22763 Hamburg, Germany, www.sam-electronics.de

Standard: All CHARTPILOT functions are in compliance with the latest ECDIS Performance Standards of the IMO, and also consider the rules like DNV NAUT-AW and LR-IBS.


Overview of System:	<p>The system fulfills all requirements with regard to route planning, track keeping and monitoring as well as anti-grounding. Ship sensor data (ARPA/AIS-targets, course, speed, position etc.) and sea charts can be observed simultaneously.</p> <p>The CHARTPILOT can operate with the following vector formats:</p> <ul style="list-style-type: none">• "official" ENC (IHO-S57/Ed. 3.1)• C-MAP CM-ENC• C-MAP CM-93/2• C-MAP CM-93/3 Professional and the raster format• ARCS of British Admiralty <p>The CHARTPILOT is ready to support the Admiralty Vector Chart Service (AVCS) which has been recently introduced by the UKHO.</p> <p>The CHARTPILOT also supports the C-MAP Real time Updating Service (RTU).</p> <p>The CHARTPILOT is also an essential part of the Integrated Navigation System NACOS xx-5 (Navigation and Command System) as it supplies the RADARPILOT, MULTIPILOT, TRACKPILOT and the SPEEDPILOT with planning, track and map data.</p> <p>The following versions are available:</p> <p>Console version, Desktop version, Dual workstation system, Conning display.</p>	
Features:	<ul style="list-style-type: none">• Built-in ECDIS back-up facilities• Dual fuel operation of vector and raster charts• ECDIS mode with ENC, C-MAP and ARCS presentation• Ready to support the new Admiralty Vector Chart Service (AVCS)• Display of NAVTEX messages• Integrated CONNING mode• Comprehensive route planning and monitoring features• Voyage recording and replay system• Display of 400 AIS sleeping targets• Activation and tracking of AIS targets• Full operation as Minimum Keyboard Display for AIS 3400/3410	
Contact:	http://www.sam-electronics.de/dateien/company/contacts.html	

16. SAM Electronics – MULTIPILOT 1100

Name of System : **MULTIPILOT 1100 – The Universal Solution**

Manufacturer & Country: SAM Electronics GmbH, Behringstrasse 120, 22763 Hamburg, Germany, www.sam-electronics.de

Standard: Meets the latest IMO/IEC requirements for radar with chart facilities

<p>Overview of System:</p>	<p>The MULTIPILOT 1100 combines radar, ECDIS, conning and automatic steering controls in one unit.</p> <ul style="list-style-type: none"> • Designed to meet the latest IMO/IEC requirements for radar with chart facilities • Type approved ECDIS in combination with CHARTPILOT 1100 • Display of NAVTEX messages • Tracking of 80 ARPA/AIS targets (400 AIS sleeping targets) • ECDIS mode with ENC, C-MAP and ARCS presentation • Six colour tables for day and night presentation including grey shaded mode • Full operation of Voyage Data Recorder DEGE 4300 	 <p>The mechanical housing concept of the MULTIPILOT 1100 is very flexible: Choice between desktop and console ver.</p>
<p>Features:</p>	<ul style="list-style-type: none"> • Provides a correlated picture of the planned and the real situation and thereby enhances the officer's capability to fully access the nautical situation and development • Combines navigation and collision avoidance functions in one workstation • Reduces the workload of the navigator by avoiding redundant data inputs and readouts at different equipment locations • Supports high resolution graphics for clear and distinct chart and radar presentation • If part of an NACOS system the MULTIPILOT also provides integrated Steering and Track Control by means of a joystick. A "Curved Headline" or any planned or commanded course change is shown on each MULTIPILOT display • Alarms and messages are consistently managed for all operator workstations • In combination with the AIS 3400/10 the MULTIPILOT supports full AIS operation which saves the costs for an extra Minimum Keyboard Display • If connected to the VDR DEBEG 4300 the internal network of the MULTIPILOT allows direct recording of the radar image • The integrated 2-way interswitch allows switching of two transceivers and two displays • A wide range of nautical sensors can be connected to the MULTIPILOT interconnection unit • In combination with DEBEG 2902 NAVTEX messages will be directly reported to the MULTIPILOT and displayed on user demand 	
<p>Contact:</p>	<p>http://www.sam-electronics.de/dateien/company/contacts.html</p>	

17. SAMYUNG – LC-3000

Name of System: LC-3000 Manufacturer & Country: SAMYUNG ENC Head Office : 1123-17, Dongsam-3-Dong, Youngdo-Gu, Busan, Republic of Korea http://www.samyungenc.com Standard: <ul style="list-style-type: none"> • Performance standards of ECDIS adopted by the IMO(A.817(19)) • Electronic chart transferring standards(S-57) and ENC table standards(S-52) by the IHO • Test methods of ECDIS operating and performance requirements specified by the IEC(IEC 61174) • Compliance of navigation equipment interfaces international standards(IEC 61162-1) • ECDIS performance standards and legal position by SOLAS V/Reg.20 	
Overview of System:	<p>Display</p> <ul style="list-style-type: none"> • ENC(S-57), RNC (ARCS), TX-90 • RADAR Display, ARPA overlay • AIS information display (display identified and unidentified symbols) <p>Integrated navigation system</p> <ul style="list-style-type: none"> • Integrated display and monitoring of (D)GPS, Gyro Compass, RADAR, Speed Log, NAVTEX, Weather Information <p>Route Planning</p> <ul style="list-style-type: none"> • Planning of waypoints and alternate route, specifying prohibited area and safety contour <p>Route Monitoring</p> <ul style="list-style-type: none"> • Constant and realtime monitoring of ship's positioning • Target plotting and monitoring <p>Automatic Voyage Recording</p> <ul style="list-style-type: none"> • Real time automatic route recording Alarms and Indications • Automatic alarms and indications of off-track from the planned route or other dangers
Features:	<ul style="list-style-type: none"> • Menus on dual languages (English, Korean/serviceable to other languages on demand) (incl. the Manual) • Various lines of products for the satisfaction of the customers • Global A/S network • Intensified function • RADAR display overlay • AIS information display • NAVTEX and Weather FAX function • Powerful report printing function (Route Planning, Chart) • Multi-user interface on LAN configuration • ECDIS, RADAR, Conning inter-switching function • Automatic optimum route planning (economical voyage)
Quote:	SAMYUNG is the leader of the marine industry in Korea with its communication and navigation technology
Contact :	postmaster@samyungenc.com



18. SIMRAD – PLECDIS™

Name of System: PLECDIS™ Manufacturer & Country: SIMRAD, USA Standard: <ul style="list-style-type: none"> • IEC 60945 (2002) • IEC 61162 Series • IEC 61174 (2008) • IEC 62288 Ed.1.0 (2008) <p>PLECDIS™ with SW version 3.1 is approved and found compliant with current regulations by DNV.</p>	
Overview of System:	<p>Simrad CS68 ECDIS has been in the market for many years and is renowned worldwide as being a 'best in class' professional electronic navigation system.</p> <p>Simrad PLECDIS™ (Paper-Less Electronic Chart Display and Information System) comprises a dual ECDIS system with built-in redundancy and is built on robust, reliable, proven technology used by professionals. Simrad PLECDIS™ runs on 24V DC, making it the most reliable ECDIS solution available today.</p>
Features:	<ul style="list-style-type: none"> • No need for paper charts onboard, end time consuming paper chart updates and enjoy the full benefit of receiving automatic updates of charts whatever your location • Automatic route sharing technology between systems. Use one operator station for planning and one as standard ECDIS • Get the full redundancy and safety benefit of running two totally separated systems • Supports C-Map CM93/3, S57 and S63 encrypted electronic charts • Online chart updates or upgrades supplied through CD/DVD/USB flash drive • Dynamic licensing • Radar overlay option • Both AIS Class-A and Class-B support • AIS filtering options • Two-way communication to AIS. Update your AIS automatically and send text messages to other vessels • Double trip counter • Ferry options. Advanced route planning with multiple harbour ETAs on same voyage, and procedure alarms • SIMRAD Backup Manager for easy and secure installation and backup functionality • Relay interface to ship's main alarm centre • Connect two monitors to the same system. Use them in clone mode and get a second cloned display on the bridge wings or use in dual mode for route planning without interrupting surveillance of the current voyage • Choose between 19", 20.1", 23" or 27" approved ECDIS colour calibrated displays
Contact :	http://www.simrad-yachting.com/Contact-us/ http://www.simrad-yachting.com/en/Store-locator/Distributors/




19. Sperry Marine – VISIONMASTER FT ECDIS

Name of System: **VISIONMASTER FT ECDIS**

Manufacturer & Country: Sperry Marine headquarters in USA (Charlottesville, VA) United Kingdom (New Malden, England) Germany (Hamburg) www.sperrymarine.northropgrumman.com

Standard: IMO-compliant type approved (IEC 61174tdz)

Overview of System:	<p>The VisionMaster FT ECDIS provides a complete IMO-compliant type approved Electronic Chart Display and Information System. It also meets the requirements for navigating without paper charts when installed with a backup ECDIS.</p> <p>The system's Universal Chart Manager is designed to work with a broad range of authorized vector and raster charts, including S57, C-Map, ARCS and PRIMAR. Charts may be uploaded directly through a DVD reader or uploaded via the optional Performance Based Navigation VisionMaster FT GateWay.</p> <p>The VisionMaster FT ECDIS features disappearing menu bars and menus when not in use, to optimize full-screen viewing of the chart display. The split-screen function (one of five display modes) permits two independent charts to be displayed simultaneously, or for displaying the same navigational picture at different chart scales.</p> <p>Multiple voyage plans can be created quickly and edited easily at any time during the voyage without interrupting the navigation process. The ECDIS automatically correlates targets with radar and AIS to minimize mistaken identity and simplify watchstanding.</p>	
Features:	<ul style="list-style-type: none">• Vector or raster chart formats• ARPA and AIS target correlation with all other VisionMaster FT workstations• Operator configurable screens (full display, vertical or horizontal split screen and picture in picture)• Navigation tools including parallel index lines, history tracks, and predicted vectors• Depth history graph• Records of key voyage and alarm information• EBL and VRM functionality with radar• Configurable Conning Information Display (CID)• iUSB portable storage device port• iHelp functions	<p>Options</p> <ul style="list-style-type: none">• Track Control complies with IEC62065• Radar overlay• Interactive Conning Information Display (CID)• Joystick and course mode• Central Alarm Management group and prioritization of alarms• Speed control• Fitness and vigilance alarm compliance• AIS control• Basic control panel for radar overlay functionality• Advanced Control Panel• Performance-Based Navigation for fuel management, electronic chart downloads corrections and ship telematics• ShipSentry – Shipboard Protection System
Contact:	E-Mail: sales_commercial@sperry-marine.com	

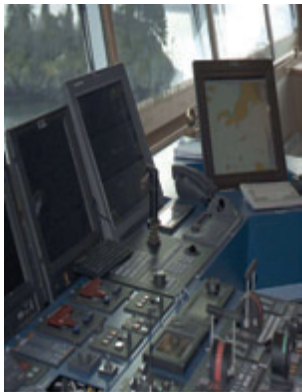
20. Telko – TECDIS

Name of System: **TECDIS**

Manufacturer & Country: Telko AS, Ødekjærveien 27, N-3145 Tjømø, Norway, <http://www.telko.no/nor>

Standard: TECDIS is compliant with:

IMO A.817(19)	IEC 60945 ed.3
IMO MSC.64(67) Annex 5	IEC 61174 ed.2, incl. Annex G
IMO MSC.86(70) Annex 4	IEC 61162 ed.2
IMO A.694(17)	
IMO SN/Circ.217	
IMO SN/Circ.243	

Overview of System:	<p>TECDIS is the first ECDIS to be approved by DNV according to the latest IMO standards. TECDIS uses S-57 Ed.3, C-Map ENC and C-Map CM-93 Professional+ data.</p> <p>All data are combined in real-time to generate world-wide coverage of charts.</p> <p>TECDIS can offer the highest degree of integration between ENC charts and commercial charts. Commercial charts are used to fill in, seamlessly, gaps in the coverage of ENC charts, also with regard to zoom scales.</p> <p>By using C-Map ENC data distributed in SENC format, all charts are converted ashore. This cuts time for updating charts down to minutes instead of hours. It also relieves the Master of tedious questions regarding the chart conversion.</p> <p>TECDIS has numerous advanced functions, like:</p> <ul style="list-style-type: none">• Voyage planning, with main and alternative route• Automatic anti-grounding system with selectable safety depth• AIS and ARPA interface• Advanced sensor filters• Storage of tracks, symbols, objects and log files• Advanced chart alarms with various settings• Advanced user interface for chart presentation• Advanced conning/docking pictures• Automatic complete situation voyage replay <p>Under development:</p> <p>Radar overlay</p> <p>Tracksteering with adaptive trackpilot</p>	
Features:	<ul style="list-style-type: none">• Tailor-made Voyage Planning• Tailor-made chart display setup• Anti-grounding system	<ul style="list-style-type: none">• Integrated presentation of AIS and ARPA• Tailor-made conning solution• Sailing without paper charts
Contact:	http://www.telko.no/nor/kontakt_oss	


21. Tokyo Keiki – ECDIS EC-8000, EC-8500

Name of System: **ECDIS EC-8000, EC-8500**

Manufacturer & Country: Tokyo Keiki Inc, Control Division/Marine Systems, 2-16-46, Minami-Kamata, Ohtaku, Tokyo 144-8551, Japan www.tokyo-keiki.co.jp/marine/

Standard:

- Complies with latest IMO standards. MSC.232(82)
- In addition to the current Track Control System (TCS), Type approval for interface with new adaptive control (NCT) autopilot (HCS) is available. IMO/MSC 74 Annex2 IEC62065 Category C.


Overview of System:	<ul style="list-style-type: none">• Easy operation• Improved installation• Can be arranged as stand alone or unit type.• Pilot Control Unit (OPTION)• Remote ECS connection (OPTION) When connected to the ECDIS by LAN, it is possible to observe the ECDIS display and create routes etc on the PC• Automatic creation of temporary route When automatic steering is initiated, a route is automatically created from the own ship position to the optional start position allowing the ship to easily enter the new route using Track Control System (TCS).	
Features:	<p>The operating mode consists Plan Mode/Monitoring Mode/Update Mode.</p> <p>Display chart ENC (IHO S-57, S-63)/C-Map CM-93/3/ARCS (OPTION) Display each countries' own language on ENC.</p> <p>Navigation monitoring along the active route (Off track, Ground avoidance), danger, prohibited area is a main function in Monitoring Mode. Possible to display a sea area that does not include the own ship position for a look ahead during route monitoring. In this case, it is possible to return to the chart area covering the own ship position immediately by pressing the 'HOME' switch on the operation panel.</p> <p>Route Planning</p> <ul style="list-style-type: none">• Route creation• No-go line/area setting• Critical point creation• Navline setting <p>Alarm, Warnings and Indications</p> <p>Track Control System (TCS)</p> <p>Other functions</p> <ul style="list-style-type: none">• History display for alarm, warning and indication• Water depth and wind information display, propeller revolution indication (OPTION)	
Contact:	https://www.tokyo-keiki.co.jp/form/webform_marinee.html	

22. Totem – ECDIS


Name of System: **Totem ECDIS**

Manufacturer & Country: Totem Plus, 6 Hanevi'im St Ramat-Hasharon, Isreal, Email: totemplus@totemplus.com

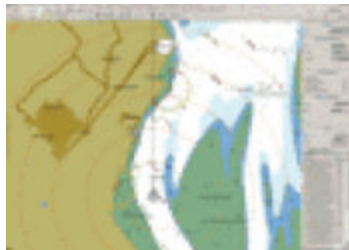
Standard: IMO Resolutions A.817 (19) and MSC.232 (82), IHO S-57 and S-52 Standards and IEC 61174, 61162 and 62288 Standards. Type approved by DNV

Overview of System:	<p>Electronic charts integrated with information from various ship navigation systems including AIS, GPS, Gyrocompass, Speed Log, Wind Sensor, Echo Sounder and more. Collision prevention algorithms minimize human error. Data logging and playback functionality.</p> <ul style="list-style-type: none">• Designed to operate in harsh maritime environments• Flexible and expandable configuration• Dynamic Licensing• Cost effective and flexible chart		
Features:	<ul style="list-style-type: none">• Electronic charts integrated with information from various ship navigation systems including AIS, GPS, Gyrocompass, Speed Log, Wind Sensor, Echo Sounder and more• Collision prevention algorithms minimize human error• Data logging and playback functionality• Interfaces with ship's navigational equipment• Route planning and monitoring capabilities• Alarm when approaching dangerous areas such as shallow waters, navigational hazards etc• "Man Overboard" mode for single-click emergency operation		
Quote:	Dynamic Licensing of "pay per use" method – only charts that are used by the ship are charged for. Great Reduction of ENC License Cost!		
Contact:	http://www.totemplus.com/contacts.html		

23. Transas – Navi-Sailor 4000 ECDIS Multifunction Display

Name of System: Transas Navi-Sailor 4000 ECDIS Multifunction Display		
Manufacturer & Country: Transas Group, International Transas Headquarters. 10 Eastgate Avenue, Eastgate Business Park, Little Island, Cork, Ireland, http://www.transas.com/company/		
Standard: IHO: Electronic Navigational Chart (ENC), Raster Navigational Chart (RNC), ECDIS Display and Presentation, ENC Data Protection IMO: Module B in the directive SOLAS 74 as amended, IMO Res. MSC232 (82), IMO Res A.694 (17), IMO Resolution MSC 191 (79)		
Overview of System:	<p>Navi-Sailor 4000 ECDIS Multifunction Display is a flexible and redundant solution providing the mariner with a convenient task-oriented environment. Every Transas MFD workstation (WS) can be equipped with a standard set of software such as ECDIS, Radar, Conning, Chart Assistant utility and SPOS weather module giving the mariner the ability to switch between applications at the touch of a button. All aforementioned applications are running simultaneously as part of the Multifunction Display.</p> <p>Integration benefits</p> <ul style="list-style-type: none">• Navigator-friendly environment for One Man Bridge operation reduces workload and stress• Clear and consistent man-machine interface for intuitive and convenient operation• Enhanced functional integration of navigational data• System redundancy: all functions of ECDIS, Radar and Conning can be available on all MFD's onboard• Palettes synchronization in all 3 applications• Order charts, charts corrections and weather forecasts online via ship communication station protected by CISCO firewall• Sensor redundancy and double network ensures data integrity and reliability for network configuration• Intelligent and efficient alarm management• Simultaneous Loaded Route monitoring in ECDIS, Radar and Conning• ECDIS Master Station status changeover to any MFD station• Simultaneous network operation of two Radar Integrator Board (RIB-2) cards is possible, one for each workstation• Distribution of radar pictures from all available radars within MFD network• Chart correction, route and user database synchronization at all workstations and applications	
	Features:	
Quote:	More than 10,000 vessels worldwide are equipped with Transas ECDIS. Transas confidently retains 30% of the world market in this field	
Contact :	http://www.transas.com/dealers/ Distributed by: Thomas Gunn Navigation Services, UK Unit 1, Miller Street, Aberdeen, AB11 5AN, Scotland, UK . Tel: + 44 (0) 1224 595045 Email: info@thomasgunn.com	

24. Tresco Engineering – Navigis ECDIS

Name of System: Navigis ECDIS		
Manufacturer & Country: Tresco Engineering, Kribbestraat 24, B-2000 Antwerpen, Belgium, http://www.tresco.be/		
Standard: The system complies with all international standards and has been wheelmark type approved by the German Federal Maritime & Hydrographic Agency (BSH). IEC-945 approved hardware		
Overview of System:	<p>Navigis ECDIS is a complete maritime chart system for SOLAS vessels. The Navigis ECDIS system is built around the Tresco Engineering ECDIS kernel and includes IEC 60945 type approved hardware (main CPU and 21 inch monitor). NaviChart ECDIS can be installed on newly built vessels, or existing vessels can be retrofitted with the ECDIS system.</p> <p>The system is able to use official charts provided by IC-ENC, Primar and C-Map.</p> <p>A dual ECDIS system may legally replace paper charts on board. EC Type Examination (Module B) certificate and EC quality system (Module D) certificate.</p>	
Features:	<p>Extra Features:</p> <ul style="list-style-type: none">• Second GPS• Electronic or Gyro compass• Depth interface• Real time updates• Weather Information• Automatic Route Planning• Conning Display• ARPA• AIS <p>Optional:</p> <ul style="list-style-type: none">• Radar Overlay	
Contact:	http://www.tresco.be/en/contact.html	

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